THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY

Publishing Office, No. 42 Pine Street.

Devoted to the Interests of Illumination, Heating, Ventilation and Sanitary Improvement, Domestic Economy, and General Science.

VOLUME XX.—No. 10.
Whole No. 358.

NEW YORK, SATURDAY, MAY 16, 1874.

$3 PER ANNU
IN ADVANCE.

[Original Communication.]

Canal Navigation in Winter: Gas Wells.

By Charles Plagge.

A most important question which has lately been much discussed is that of cheap transportation. Conceding to water transportation the advantage of greater cheapness over rail-transportation, there remains the solution of the problem, by what means can the season of navigation be prolonged. It was Mr. R. A. Chesebrough who conceived first the bold idea of keeping a canal perpetually open, by means of artificial heat, and he estimates the first cost of plant for a canal 360 miles long and 70 feet wide (like the Erie canal) at $2,257,500, and the annual charges of maintenence at $1,321,000. The same object may, I think, be served at a very much smaller expense.

1. By substituting steam towage for horse-power on the canal.

2. By utilizing the warm water of artesian wells.

3. By feeding the canal by means of covered aqueducts instead of open ditches.

4. By utilizing natural gas wells, whenever they are obtainable, at a reasonable expense.

The data upon which I base my calculations are the following:

The present locks of the Erie canal can pass 200 boats every twenty-four hours. According to the trial trips made last Fall, by the steamboat New York, carrying ovor 200 tons of freight, it consumed 20 pounds of coal per mile. If, therefore, all of the 200 boats were propelled by steam, they would require 4,000 pounds of coal per mile. Assuming that nine-tenths of the heat evaporation was utilized by the condensing engines of the boats, for warming the water of the canal, we would gain a supply of heat equal to 3,600 pounds of coal per mile. Considering this inadequate to prevent the water from freezing in very cold weather, we will assume that, for each mile of canal, two artesian wells were sunk, each 400 feet deep, and discharging on an average 5,000 gallons of water, of 50° F. (the temperature of the earth at that depth) producing a caloric effect of $(2\times8\times500)\ (58-32)$ $=2,08,000$ calorific units, equal to the heat generated by the burning of 280 pounds of coal per hour, or 4992 pounds of coal per 24 hours. The total supply of heat obtained from both sources (the artesian wells and the escape steam of the boats) is therefore equal to $4992+3600=8592$ pounds$=3\ 83$ tons of coal per 24 hours for each mile of the canal; an amount which is amply sufficient to keep the channel of the canal open for navigation, in all but the very coldest days of the winter, until the extreme cold weather has passed, as it will require a period of least 6 to 8 days of severe cold weather, before enough ice could be formed to impede navigation to any serious extent. Granting this, there will scarcely be on an average, ten to twenty scattered days throughout the entire year, during which navigation will have to be suspended, as the meteorological observations of Prof. Owen W. Morris (which he kindly permitted me to examine) conclusively prove.

Assuming, therefore, that two artesian wells, of an average depth of 400 feet, each discharging 5000 gallons of water of 58° F. are required for each mile of canal, to keep navigation open in winter, the first cost of 350 miles long, and 70 feet wide, will be $2\times350\times400\times9{\cdot}67=\$2,707,600$ (estimating the drilling of the wells at $9·67 per foot). Artesian wells, requiring scarcely any expenditure, either for repairs or attendance, the cost of maintenance is almost exclusively confined to the charge of interest on first cost of plant, which in this case, at 7 per cent. per annum, amounts to $189,582; or, with a liberal allowance for superintendence, repairs, etc., need not exceed $240,000 per year—which is less than *one-fifth* of the expense annually required to keep the same canal open, according to Mr. R. A. Cheseborough's plan, by artificial heat. A further advantage of the proposed plan is, that by it we obtain a large additional supply of water (amounting to 3,500,000 gallons per hour) available for the lockage of boats, and of great value in dry seasons, in which the regular water supply of the canal falls short, which, as is well-known, is frequently the case with the Erie and other State canals. As, by the proposed means, the carrying capacity of the Erie canal would be increased, on account of the longer duration of the shipping season, and larger supply of lockage water, at least 3,000,000 tons per year, its *net revenue* would be augmented (at present rates of toll) by from $1,000,000 to $1,500,000 per year. The entire outlay for plant, therefore, would be recovered from the increase in receipts from tolls in less than three years.

Where the geological formation of the country is unfavorable for the sinking of artesian wells, we may utilize the heat of the earth, by conducting the feeders of the canal in covered aqueducts, instead of open ditches. A far more important source of heat available in many sections of this State, we may obtain by utilizing the numerous *gas-wells* which here abound. According to Prof. Henry Wurtz's highly interesting paper, read before the N. Y. Society of Practical Engineers, at their regular meeting, Nov. 15, 1871, *vide* American Gas-Light Journal, Dec. 2, 1871, pp. 162 and 164) there are at least three belts of gas-wells running across the State of New York from east to west. Arguing from numerous observations, Prof. Wurtz assumes the average tension of compression of the gas contained in the three gas charged horizons (the Salina Marcellus, and Genesee), at 20 atmospheres. Estimating the porosity of the rock at only 5 per cent. of its volume, the whole gas contained in the rock will assume at the surface the volume of the rock itself. If, therefore, the three New York belts are 200 miles long, and equal in mass to ten miles wide, and of 100 feet thickness (a moderate allowance) they will supply more than three thousand wells, each discharging 500,000 cubic feet of gas per 24 hours, for over 100 years. As, practically, 20,000 cu. ft. of marsh gas (the principal constituent of the gas of natural gas wells) may be assumed to be equal in heating capacity to one ton of anthracite, the amount of heat which could be drawn throughout the middle tier of counties in western New York, is equal to 75,000 tons of anthracite per day, or to 27,375,000 tons per year. Although the line of outcrop of the Marcellus formation, from which the West Bloomfield gas comes, lies south of the line of the Erie canal, Prof. Wurtz has also shown in the same memoir, that the gas found in boring at Buffalo comes from strata lying far deeper, and cropping out many miles further north than the Marcellus; and that on the general line of the canal, the Hamilton and Salina will be found for great distances, so situated as to be reached by borings not far therefrom, and at depths which will ensure their having retained their original gaseous contents unimpaired by outcrop leakage. It may therefore be accepted with implicit confidence, according to the same authority, that there are throughout that part of the state, large districts within which, by judicious explorations, an immense number of natural gas-wells may be developed, furnishing a fuel which *raises itself* out of the mine, and which may be made to transport itself to any point required. This almost inexhaustible source of fuel is the more valuable for the warming of the water in the canals, as the apparatus required can be constructed at a comparatively small expense, and in such a way as not to need any extra hands for its attendance; so that the expense of keeping navigation open all winter will be confined to little more than the interest on first cost of plant, which will probably not be greater than that as estimated above for artesian wells.

By introducing fireless tugboats, operated by superheated water, like the fireless locomotives now in successful operation on the New Orleans and Carrolton Railroad, the expense of towage on the canal could be reduced to a minimum, by utilizing the gas of the natural gas-formations, for superheating the water used by the fireless tugboats.

The utilization of the warm water of artesian wells, of the gas of natural gas formations, and the substitution of steam for horse-towage on the canal, offer probably the most economical means of prolonging the season of navigation on canals running through northern countries; of increasing largely their carrying capacity, on account of the longer duration of the shipping season and the larger supply of lockage water; and of cheapening the expense of transportation of the products of the west to the shores of the Atlantic.

Chemical Repertory.

No. 112.—May 16, 1874.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

1107. Sanitary.—The following two items from a Jersey City paper fit into each other:

"The impurities of water are attracting much attention along the Palisades."

"Scarlet fever is now raging up and down the Palisades."

1108. Orsat's Apparatus.—When we copied, in our last issue, from *Iron*, an account of an apparatus for analysis of gaseous mixtures—of greatly over-estimated value—we were not aware that it is a patented affair, patented, at least in England, May 22, 1873. Our readers will of course take heed, not to subject themselves to suits for infringement.

1110. Drinking Water and Zinc.—In a communication to the Royal Society of Edinburgh, James R. Napier called attention to the fact that zinc from galvanized iron goods dissolved very rapidly in Loch Katrine water. He exhibited water of a milky color, made so by immersing 2½ lb. of galvanized iron nails and other objects far about 30 hours. He also showed pieces of a kitchen boiler, which had been coated by the so-called galvanising process, in which, after 12 months' use, the zinc coating had entirely disappeared, and the iron itself was greatly corroded.

1111. The New York Legislature.—As to this body, now decently defunct, the *World* says: A few local gas bills were passed, but nothing accomplished in the way of protecting the people of the State against the gas monopolies, and at the same time securing the gas manufacturers against being defrauded by the consumers.

1112. Coke and Anthracite.—At the February meeting of the American Institute of Mining Engineers, the President exhibited a sample of coke made from a mixture of anthracite and bituminous coal, half and half, in the gas coking furnace invented by Mr. W. A. Sweet of Syracuse, N. Y. The coke was very peculiar. The lumps of anthracite, presenting a graphitic, highly lustrous appearance, were firmly embedded in a matrix of ordinary coke, and the whole appeared to be sound and firm.

1113. The Oil Wells Shut Down.—This movement, or rather cessation of movement, should reduce the existing stocks of oil by some hundred million gallons or so.

"The good work has commenced—the drill to hang in the derrick for the next ninety days—let it rest, and rust, too—the great movement successfully inaugurated," are the headlines in the Titusville, (Pa.) *Courier*, which announces that the oil producers propose to give themselves and their wells a rest for the purpose of raising the price or reducing the production.

1114. Hydraulic Operation.—A number of skillful machinists from Altoona are engaged in constructing an English water-trough at Monmouth Junction, designed to furnish water to locomotives while under full speed. It will be a half-mile in length, midway between the rails, and the water will be six inches in depth. Monmouth Junction is half way between New York and Philadelphia, and it is believed that an important saving of time will be effected for the through trains.

1115. Irrigation on the Pacific.—Water, in California, is no longer regarded as merely an agent in hydraulic mining. The importance of irrigation has been recognised. A "rush" has taken place. Speculators have striven for concessions, and the water power of California is in danger of falling into a few hands. Companies have been formed, and entire lakes have been acquired. One of these will shortly be utilised, and will furnish immense volumes of water, doubly precious in a great grain-producing country where there is no rainfall for eight months in the year.—*Iron.*

1116. The Bunsen Burner.—B. Blochmann says that the flame of a Bunsen burner consists of two zones of combustion cone shaped, between which is a cone of the products of combustion and unburned gases containing about six per cent. of combustible gases heated to an intense heat.

M. Lecoq de Boisbaudran exhibited lately, to the French Chemical Society, a Bunsen burner made of glass, which he recommends for incinerations and spectroscopic researches in order to avoid the presence of copper.

1117. A Bright Boy.—The uncomfortable fix some boiler-makers at Dubuque, Iowa, got a boy into recently, is an amusing illustration of the necssity that exists for a general preliminary survey of operations to be accomplished. The boy in question assisted the workmen, by remaining inside the boiler to hold a hammer against the rivets while they were being headed on the outside. When the boiler was done, the boy was needed inside no longer; but when he attempted to make an exit, the hole left for the purpose was found to be too small, and it took six men three hours to make a hole large enough to release him.

1118. Life Buoys.—English papers describe an invention which substantially consists in grinding or cutting cork shavings small, and roasting or burning them to a dark brown elastic char, which causes it to swell and to be more buoyant and impervious to water, and then in filling the said ground burnt cork into small bags made of oil or other waterproof fabric and sewing these into canvas life-belts or other shaped buoys for the purpose of floating bodies in deep water, and thus saving life and property.—*Mining and Scientific Press.*

1119. Arsenical Paper Again.—An infant child of Morris Langton, Jersey City, was poisoned April 29, by sucking a piece of green card. The mother did not observe what the little one was doing until it had time to swallow enough of the poison to sicken it. She at once proceeded to Moore's drug store, where an emetic was procured, which caused the child to vomit freely. Dr, Morris was afterwards called in and prescribed for it, and it soon recovered.

1120. Ventilation.—According to Pettenkofer, the air in our houses becomes unwholesome when the carbonic acid in it, provided it be derived from the respiration of animals, rises from the normal proportion of four parts in 10,000 to one part in 1000. The experiments of Dr. Angus Smith and Dr. Hammond have shown that the organic matter in the air, which increases in proportion to the amount of carbonic acid, is by far a more deadly impurity than the gas.—*Sanitarian.*

1121. Coal-Tar and Timber.—The *Technologist* tells us that it has been found that if posts be slightly charred on the surface, and then coated with hot coal-tar, they will not decay for many years. The tar must be hot, and applied to the freshly charred hot timber, otherwise it will not penetrate the pores, and failure will be the result. Merely charring a stick of wood, or painting it with coal-tar, will not preserve it; but when the two are combined, as we have directed, posts seem to last indefinitely.

1122. Explosion of Gas-Coal.—Recently, as *Iron* relates, a terrific and fatal gas explosion took place on board the Swedish brigantine Johanna Mathilda, Capt. Niel Olsen, lying near the mill dam, south side of Shields harbor. The vessel was laden with gas-coal ready for sea, bound for Riga. The hatches were battened down, and the crew were engaged cleaning the decks ready for sea, when the after-part of the hold suddenly exploded, shattering the decks and destroying the cabin and cook-house. Olaf Olsen, the mate, was blown into the air and killed instantly, his brains being dashed out; three others of the crew, Fritz Anderson, Carl Jorensen, and Per Sjostrem, were also severely injured.

1123. Street Lamps.—A correspondent of the London *Journal of Gas-Lighting*, Thomas May, says:

"A great improvement may be effected by placing plates of tin on the outside of the tops of the present street lanterns in use, covering the plates with panes of glass. The reflectors, being between two panes, will be preserved from heat and weather, the glass preventing them from oxidising; they will last for many years. The rays of light by this method will be thrown down. The top and both sides of the sheets of tin should be ¾ inch smaller than the glass, giving the tops of the lamps when alight a very cheerful appearance. If any of my brother engineers will try this plan on a dozen lamps in any one street, they will find very beneficial results from its adoption: very powerful reflectors are thus obtained at trifling cost."

1124. Pure Coralline Non-Poisonous.—Shortly after the discovery of coralline, one of the new aniline dyes, attention was called to certain cases of poisoning resulting from wearing stockings and other garments which had been colored by it, and a strong prejudice arose against its use. This led to various investigations to determine the facts in the case, and among others, one by Prof. Tabourin, of the Veterinary School of Lyons, whose report was published in *The Annals of the Agricultural Society* of that city. In this he comes to the conclusion that pure coralline, as usually furnished in commerce, is a substance entirely harmless, and that its employment in dyeing and painting may be continued with perfect safety, provided that it be fixed upon textile fiber and upon tissues, by the aid of substances destitute of poisonous properties.

1125. Poisoning by Carbolic Acid.—A patient in a hospital, through mistake of the attendant, took a tablespoonful of a solution of one part of carbolic acid, and six parts of water, instead of an infusion of senna. A burning sensation in the throat, vomiting, and contraction of the pupils of the eyes ensued. As soon as medical aid was at hand, the stomach was cleansed three times with water by the aid of the pump. Still the patient suffered severe pain, and became insensible to light. The pulse became rapid. A cold, clammy sweat, deep sleep, and finally death ensued. A post mortem examination of the contents of the stomach, of the liver, the heart and venous blood, and of the urine was made. No carbolic acid was detected except in the stomach, from which it was inferred, either that the acid had not been diffused through the system, or that it had been diffused in so small quantity as to escape detection.—*Amer. Chemist.*

1126. English Gas-Patent to an American.—W. H. St. John, New York.—Improvement in processes for purifying illuminating gas, and apparatus therefor.—These relate to the purification of illuminating gas produced by distillation from bituminous coal, oils, resin, and similar materials. They are designed to effect such purification without the use of any water whatever, other than that evolved from the coal or other gas-producing substance while being distilled, to dispense with the usual purification by means of lime or oxide of iron; and to secure a larger quantity of gas from a given weight of coal than is possible with the gas-making methods and operations hitherto in use. In use the gas comes into contact, in a chamber separate from the main, with the condensed products brought over from the retorts during distillation, this aqueous liquid absorbing the ammonia from the gas, and fixing the same by means of the acids held in solution, or absorbed from the gas by the liquid the tar particles being meanwhile caused to agglomerate in the liquid; also comprises a chamber distinct from the main, which receives the gas from the retorts; also, the combination with the purifying cham

ber, of a secondary chamber or tank wherein any moisture is condensed, previous to the passage of the gas to the gasometer.

1126. WELL-WATER IN THE CITY OF HANAU.—Heraes has examined the water of some 15 wells. These wells are all fed by the river Kinzig, and contain variable quantities of salts, particularly nitrates, and of decaying organic matter. The water of wells near cesspools, vaults, or other sources of impurity becomes contaminated by infiltration, and always contains relatively large quantities of the above mentioned impurities. The water of the Kinzig contains per liter 21·2 centigrammes of solid residue, and five milligrammes of nitric acid. The fixed residue of water from different wells varies from 36 to 140 centigrammes, and the nitric acid from 54 to 291 milligrammes, and the decaying organic matter from four to nine milligrammes per litre. The writer concludes that well-water is injurious to health, which gives with potassium iodide, starch, and sulphuric acid a blue color. Epidemics, like typhus fever, he thinks, are induced by such water, and he mentions several remarkable coincidences of the prevalence of typhus, where such water has been used as a beverage.—*Am. Chemist.*

Consumption of Coal in the United States in 1873.

Taking the official returns of the production of anthracite coal in the United States in 1873, together with the official returns of the bituminous coal produced and sent towards the seaboard, and from further data estimating the balance, we give the following as the total coal production in 1873:

Anthracite sent to market, tons.....	19,585,178
Anthracite consumed in coal regions.....	3,243,000
Total production of anthracite.....	22,828,178
Bituminous coal sent towards sea-board, embraced in our table.....	5,515,784
Estimated production of bituminous coal not embraced in our tables.....	16,500,000
Total production in 1873.....	44,843,962
Foreign coal imported.....	456,015
	45,299,977
Exported.....	584,633
Total supply for consumption, 1873.....	44,615,344

It will be seen by the above figures that the quantity of anthracite and bituminous coal produced as nearly equal, as follows:

Total anthracite.....	22,828,178
Total bituminous.....	22,015,781
Total.....	44,843,962

In 1865 we commenced estimating the quantity of all kinds of coal produced in the United States from the regions not embraced in our table, and we have put down the production of coal in this country as follows, since 1864:

	Tons.
1864.....	22,500,000
1865.....	24,400,000
1866.....	28,855,918
1867.....	28,367,847
1868.....	21,479,114
4869	38,671,010
1870.....	36,622,131
1871.....	37,864,415
1872.....	42,749,243
1873.....	44,843962

This shows an increase of upwards of 100 per cent. in the production of coal in the United States within the last ten years, and if the same ratio of increase should continue for the ensuing ten years, the consumption in 1883 would reach 90,000,000 tons; and there is no reason why the same proportionate increase should not continue for a number of years to come, as wood is now becoming scarcer every year for fuel, and but few use it when they can procure coal as a substitute. Nothing but an abandonment of our protective policy, which would check this increased production. It is the great manufacturing interests of the country that consume the great bulk of coal produced.

In England, in 1854 the production of coal was, in round numbers, 64,000,000 tons, and in 1872, a period of nineteen years, the production had increased to upwards of 123,000,000 tons, nearly double the product in that period in an old country, which has but a small territory, and where the increase in population is not one-fourth as great as in the United States, so that with enlightened legislation there is no reason to suppose that the production in the United States will fall short of 90,000,000 tons in 1884, which would require an annual increase of 4,500,000 tons.

The investment in the coal business to produce 45,000,000 tons of coal annually, and to carry the same to market, is immense, amounting in the aggregate to not less than probably $500,000,000, and to produce this additional quantity, and to transport it to market in the ensuing ten years, the reader can form some idea of the additional capital that will be required to furnish that quantity for consumption.

Of this increase in the supply of fuel, the anthracite regions will not qe able to furnish more than probably 13,000,000 tons in addition to what they now produce, as we do not believe the whole product of anthracite will ever exceed 34,000,000 tons annually, and of this quantity not less than 7,000,000 or 8,000,000 tons will be consumed within the coal regions, leaving only about 26,000,000 to 27,000,000 tons to be sent to market, against the 19,585,178 tons sent in 1873. This would leave abovt 32,000,000 tons increase to be furnished from the bituminous regions of the country, in addition to the present supply.—*Pottsville Miner's Journal.*

Explanatory Regarding "Wollongongite."

[Concluded from page 149.]

There can be no question, I think, that Wollongongite is a *misnomer*, and that Prof. Silliman will change it. But if any doubt remains, the author has himself ignored it, for he has furnished a fact to complete the evidence, which could not be made applicable by present experience to the Illawarra. He says: "Associated with the bituminous shales is a seam of 18 *inches of a semi-elastic caoutchouc* which cuts easily with a knife, is easily kindled by a match, and yields the odor of a candle when extinguished. It affords about sixty gallons of crude oil. I failed to note its position in the section." He further mentions, that he saw, after his discovery of the technical value of the mineral, several masses, two of which "weighed about 100 pounds each, were *prismatic in form* and exhibited no structure, opposing an equal resistance to the hammer in all directions, and breaking only with extreme difficulty." This *prismatic form* was mentioned by me in my paper on *Australian Cannels*, read before the Geological Society of London, on April 11th, 1866, as belonging to the Reedy Creek Cannel; and I saw *in situ*, when I accompanied Mr. Want through his mine, the *elastic caoutchouc in situ*. These additional facts still further justify the identification of the locality.

My object in making this comparison is by no means to depreciate the Illawarra products; and I repeat this affirmation, because on a former occasion, a passage curtailed in the paper I have referred to, which was "abridged" in London before it was printed, seemed to infer that I thought lightly, which I do not, of those products; the remark I made being comparative only.

It is only right that a mistake of a kind likely to mislead should be corrected, especially as discovery seems to be multiplying species in mineralogy, as in other sciencos.

Thus we have, under the general head of hydrocarbon compounds, besides *five series* of *simple* hydrocarbons, *seven of oxygenated* hydrocarbons, in which we find *Tasmanite*, the peculiar *resiniferous* shale, of the river Mersey, in Tasmania: and *Dysodile*, of which there are several varieties, which have not yet been parcelled out into species, but belonging to the same group as Tasmanite; whilst the historical mineral of Scotland, placed in the *Succinite group* of the oxygenated hydro-carbons, is called *Torbonate*, in in which occurs another variety called Bathvillite, both taking their names from Torbane-hill, in the Bathville property.

And now we have another remarkable hydrocarbon, designated *Wollongongite*, of which Prof. Silliman says, from its characters, "this substance obviously resembles *Succinite*, and is probably as well entitled to a place in the system as *Bathvillite* or *Torbanite*."

Under the impression that it is an Illawarra mineral, he says: ', It comes from an elevation of 250 feet above tide, and five miles inland, at a point about 40 miles from Sydney."

Should it hereafter be proved to occur in Illawarra, it will be well for the proprietors of the mines; but, called by whatever name it may be, it is satisfactory to have in this colony, within 100 miles of the metropolis, so valuable a gas-producer as this mineral appears to be. The details of the results of its examination are too numerous to be given; but the general facts are most striking.

Assuming the standard candle in use among gas engineers to consume 120 grains of sperm per hour, one cubic foot of the mineral in question is equivalent to 26.54 candles, whilst the richest Boghead is only equivalent to 10.38; the Lesmahago to 8.77; and the Wigan to 3.04. The theoretical density of the gas obtained is 1.716, nearly double that of olefiant gas; whilst its loss of illuminating power under refrigeration to 0° Fahr. is not greater than that of common street gas at that temperature. The average yield of five charges of gas per ton equalled 13,716 cubic feet; they gave coke, 420 lbs. per ton: and four bushels of lime purified 5.686 cubic feet. This degree of illuminating power, says Prof. Silliman, is, "so far as we are informed, *unexampled* in the records of gas-making from any material heretofore examined.

Prof. Silliman mentions that Mr. Hall brought other "specimens of a bituminous shale, quite earthy in character, of an *elastic bitumen* and also of a cannel coal somewhat resembling Wollongongite, but unlike that substance in its essential features. It has a well developed laminated structure, a nearly black color, and is streaked with micaceous and earthy particles, visible in the mass." A block of this sent to Columbia College School of Mines, was examined by Prof. Chandler, who communicated to him its analyses:—density, 1·106; gravity of crude oil, 0·876; quantity per ton of 2000 lbs., 96·8 gallons (af 231 cubic inches). The coke was 40·48 per cent., whilst in the Wollongongite the coke percentage was 17·50.

On the 3rd June, 1869, Prof. Silliman writes further respecting his subsequent test of the *Wollongongite*, by the hydrocarbon gas process, by which it appears that when 5 per cent. was mixed with 95 per cent. of the bituminous caking coal of Westmoreland, Pennsylvania, the increase of gas was equal to 1·08 cubic feet, or 16,464 cubic feet per ton of 2240 lbs. "There is an increase, therefore, of 232½ per cent. in the gas obtained under the influence of the hydrocarbon process."

"Wollongongite has, therefore, the power to raise the illuminating intensity of gas from common coking-coals, when treated by the hydrocarbon process, even when so small a quantity as 5 per cent. is employed, much above the average of illuminating gas in common use; whilst, at the same time, the volume of the gas produced exceeds 16,400 cubic feet per ton against 10,000 cubic feet by the common process of a much lower illuminating power."

There remains only one suggestion of Prof. Silliman to be mentioned. He says: "The probabilities are, that the material occurs in various degrees of purity, and that these shade off by imperceptible degrees into each other, as is observed of many cannel coals. It is, therefore, quite possible that the Wollongongite may sometimes be found, on more extensive exploration, free to a greater degree of the contaminating 'ash.' In that case we may expect to see it assuming a more or less transparent *honey* or *wax yellow aspect*, such as it now shows in thin shavings under the microscope."

I cannot help remarking that this aspect was that which I mentioned as *resin* in my paper on the Coal Fields in the catalogue of our Exhibition in 1861 (which paper was afterwards *burked* in the London reprint), and it was that which induced me to think well of it as a profitable material; and it now appears that Succinite (which it represents) is a material

characteristic of Torbanite and Bathvillite, especially the latter; so that the conclusion of my paper before the Geological Society was correct, on this ground as well as on that I adduced, that the Reedy Creek cannel is an analogue of the "Bog Head cannel of Scotland."

If I receive from Prof. Silliman any fresh information on the subject I will communicate it hereafter.

W. B. CLARKE.

St. Leonards, 22nd March.

P.S.—In a private communication furnished by Mr. Hall to Prof. Silliman, the crude oil, as determined by Mr. Young, of Glasgow, gave—

Mineral.		Gallons.
Turpentine (light naphtha)	.....	8
Burning oil "	"	72
Lubricat'g oil "	"	33
Paraffine, 49 lbs.	"	5
Loss, ash, etc. "	"	32
		150 for 152

The gas is said to be 16,000 cubic feet per ton. The *maximum* yield stated by Prof. Silliman is 14,000.

[From the New Orleans *Daily Picayune*, April 21, 1874.]

The New Orleans Gas Case Decided.

SUPERIOR DISTRICT COURT.

Judge Hawkins, of the Superior District Court, yesterday rendered the following decision:

Crescent City Gas Light Company vs. the New Orleans Gas Light Company—State of Louisiana, Intervenor—City of New Orleans, Intervenor.—This action is brought by the Crescent City Gas Light Company, which is shown to have been incorporated by an act of the General Assembly, April 20, 1870, which act vests in the company the exclusive right to make, distribute and vend gas in the city of New Orleans for a period of fifty years, commencing on the first day of April, 1875. It is alleged in the petition that the charter of the New Orleans Gas Light Company which was granted in 1835, expires and ceases, by the terms of the grant, on the first day of April, 1875, and that the exclusive right to make and vend gas in the city of New Orleans from and after that date accrues to the plaintiff by the terms and conditions of its charter. That notwithstanding the charter of the New Orleans Gas Light Company ceases on the first day of April, 1875, by its own terms, yet said company is insisting that it has the right, and proposes to continue to make and vend gas in the city of New Orleans for a period of twenty years, from and after April 1, 1875, under an additional act of the General Assembly, passed in March, 1860. This act of 1860, it is alleged, is unconstitutional and void, because the title does not disclose the object of the act, and, therefore, the defendant is entitled to claim nothing under it.

The State of Louisiana intervened in the suit, alleging that she had an interest in seeing the laws faithfully executed. The allegations of the petition of intervention on the part of the State adopt substantially all the averments of the petition of the plaintiff, the Crescent City Gas Light Company, and claim nothing for the State herself.

The city of New Orleans intervened in her own behalf, and opposed the pretensions of the plaintiff, and those of the State as intervenor, as well as the pretensions of the defendant, the New Orleans Gas-Light Company, and claims for herself that the act of 1860, which in terms extends the charter of the New Orleans Gas Light Company for twenty years, is unconstitutional, null and void, and that the city of New Orleans has the right secured to her by the charter of the New Orleans Gas Light Company, to purchase the works at the expiration thereof on the 1st of April, 1875, and as a consequence following she has a vested right to make and vend gas on her own account, as well gainst the defendant whose right to make and vend gas ceases on that date.

The defendant, the New Orleans Gas-Light Co., first pleads the peremptory exception of no cause of action being shown by the plaintiffs on the intervenors, and prays that the suit be dismissed. An answer was also filed, which put at issue all the averments of the plaintiff and the intervenors, averring affirmatively the constitutionality of the act of 1860, which extends their charter for twenty years from and after the 1st of April, 1875. The exceptions and answer were tried together.

The first question presented for solution is the exception of no cause of action, for if it be held that the petition shows no cause of action, the suit would be dismissed without further examination.

In dealing with the question of the cause of action the claim of the plaintiff must first be considered, and for this purpose the position of the defendant must be noticed.

The plaintiff rests his right of action in *presenti* solely on his exclusive right which arises on the first of April, 1875, for that on that day he has secured to him the exclusive right to make and vend gas in the city of New Orleans; that the assertion of the defendant that he has a right to make and vend gas on and after that day, he (the plaintiff) is in *presenti* injured and damaged by such report, because by such assertion and report his credit and character are injured. For that, by the terms of his charter, he is required to be ready to supply the wants of the people of New Orleans with gas lights on the 1st of April, 1875: and if the New Orleans Gas Company is allowed illegally, under an act void for unconstitutionality, to publish to the world that it has the right to furnish the people and the city with gas-lights for a period of twenty years longer, his ability to do so would be greatly impaired, if not entirely destroyed, and, therefore, he having shown a present injury resulting from such pretensions on the part of the defendant, has a right of action to redress such injury, without waiting until the time arrives for him to commence active operations.

The action is assimilated to jactitation, though not jactitation itself. The plaintiff and defendant claim the right, under different grants from the same source of power, the Legislature, to make and vend gas for the people of the city of New Orleans, at the same time. The plaintiff, the Crescent City Gas Company, resting its right on an exclusive grant, avers that the claim of the defendant is a slander upon its title. The rights of the parties in this controversy being derived from statutes public in their nature, and reposing large interests, as well as imposing numerous obligations and duties upon them, given to the parties the right to have their differences settled judicially without delay, and before they are required or authorized to enter actively as rivals into the business of making gas. For the making and vending of gas for the use of the public is in some measure a public right, which the public have an interest in having secured to them beyond dispute or doubt. If, therefore, it should be found that the right of the defendant to make and vend gas under existing legislation ceases on the first of April, 1875, and that right is given exclusively to the plaintiff, then it might happen, in case of the postponement of the question until that date, that the city of New Orleans would be left in darkness for a time for want of the necessary preparation on the part of the lawful agent to make it. I conclude, therefore, that the petition discloses a cause of action. It is unnecessary to notice the intervention of the State, further than to remark that she has disclosed no interest in the litigation between the plaintiff and defendant, which would in any way be affected by a decision adversely to either party.

The intervention of the city of New Orleans, however, presents a different state of affairs. By the terms of the amended charter of the New Orleans Gas Company, passed in 1845, the right was given to the city to purchase the works of the company at the expiration of the charter, in April, 1875. This right is obviously a valuable one to the city, because it impliedly confers upon the city the right to make and vend gas on her own account from and after that date. This right has in no way or manner been abridged by any subsequent legislation in reference to this charter, except by the terms of the act of 1860, which postponed the exercise of this right for twenty years from the time fixed for the termination of the original charter, in 1875. The city of New Orleans therefore now asserts her desire to avail herself of this valuable franchise at once, and for that purpose she avers that the act of 1860 is unconstitutional. Still, the act of 1860 does not repeal or abridge her right to purchase the works and use them on her own account from and after that date.

In the order of time the first question to be settled is the constitutionality of the act of 1860.

The only question urged against the validity of this act is that the title does not disclose the object of the act. The title to the act is: "An act to extend the area of gas lighting in the city of New Orleans, and to reduce the price now paid by consumers." The word "object," as used in the constitution of 1852, which was in force at the time this act was passed, must be held to mean the purpose the Legislature had in view in passing the act. The purpose could not have been to promote or enhance the privileges or prerogatives of the company, but, on the contrary, it must have been to benefit the people who, of necessity, must patronize those who had obtained the franchises. Following out this analogy the Legislature, considering the increasing public wants, enacted that the area of gaslighting should he extended. This, I conclude, was the object or purpose in view by the Legislature in passing the act of 1860, and not their purpose to increase or enlarge the privileges of the company. There being no other objection urged against the validity of this act, and an examination of the act discloses nothing inconsistent with any other provision of the consttution then or now in force, and nothing inconsistent with the well-settled principles of constitutional law. The act of 1860 is constitutional.

The next question for consideration, so far as the city of New Orleans is concerned, is whether this act being constitutional postpones the right of the city to purchase the gas works in 1875, according to the terms of the charter.

The city insists that she has the right secured to her by the terms of the charter, which it must be conceded is a valuable right, implying that she had the right from and after the termination of the charter, to use said works for the purpose of lighting the city. This provision of the grant recognizes the full right of property and ownership to the gas works to be in the company, and makes provision for their sale at the expiration of the charter, at a price to be ascertained by appraisement of their value, and designating the mode and means of payment.

According to the terms of this provision, when taken in connection with the clause extending the the charter, it is manifest that the Legislature had in contemplation the use of these works for the purposes for which they had been originally designed. It seems then, to follow logically that the postponement of the charter of the company for twenty years after the time fixed for its termination, postpones the right of the city for the same length of time to purchase the works, because the right to continue the organization of the company carries with it the right to own and operate the works of the company. This disposes of the interventions, and leaves only the remaining questions of the exclusive grant given to the plaintiff by the charter to the Crescent City Gas Company to make and vend gas in the city of New Orleans for a period of fifty years, commencing on the first day of April, 1875. The great length of time embraced in this exclusive grant causes us to pause, and consider well the legal principles on which monopolies are made to rest, and the sources of power from which the sovereign derives the right to invest them with exclusion. The constitution of every government is at war with the doctrine that the law-making power may at will, and in the exercise of a mere caprice, or fancy, create and invest a company or an individual with a monopoly over any legitimate or lawful pursuit. Such creations whenever and wherever made, have met with stern rebuke and condemnations from all publicists and jurists, in every age and in all parts of the civilized world. Monopolists have, however, received sanction for a limited period of time, in matters of great public importance, where individual enterprise might fail or be inadequate, for lack of means, or the security for realizing a reward for the investment. But in all such cases the grant is or should be kept within such bounds as not to intrench upon the vested rights of labor, or the rewards of labor, but should be so adjusted as to allow every person to freely engage in and pursue any vocation or business, the same as all other persons. Take the case of the slaughtering of animals for food in the city of New Orleans, where a company was created to supervise the slaughtering of animals for food, and a place was designated within which th slaughtering must be done. Here is a monopoly of a particular kind created, but it was held that this monopoly in no wise interfered with the rights of labor, because every person was permitted, under the restrictions imposed, to follow the business of slaughtering animals for food. The monopoly in that case was sanctioned on the ground of sanitary and police regulations, which did not contain an abuse of the police power. This decision loses much of its force as an authority, on account of the division of the Judges of the Supreme Court of the United States on the question. There being five of the Judges in favor of the validity of the act and four against it. It cannot be disputed that a change has taken place in the public mind every where on the right of State Legislatures to grant monopolies. This change is marked by the current of legislation—the restrictions placed upon them by constitutions, and the enlargement of the rights of mankind by amendments to the Constitution of the United States. The right to create a monopoly springs from and is founded on necessity,

and to the extent of that necessity in any given case, the right is limited. The question of lighting a city with gas is a public necessity, which cannot be safely entrusted to many persons. It must be directed by an individual will, and requires a large amount of ready and available capital to make it permanently successful. The course of legislation in this State, shows that it is not in the judgment of the Legislature any longer necessary to have a monopoly of gas-making, for the public purpose of lighting the city with gas, because the act of 1860 has repealed that exclusive privilege, which had been previously granted to the New Orleans Gas Company. This refusal to continue the monopoly which had previously existed for forty years, under the grant by that Legislature, was a step forward, and a rebuke to the license which had been previously indulged in by the Legislature of 1860 must be taken, therefore, as the judgment of the people of Louisiana that it was no longer necessary for the benefit of the public that a monopoly should be conferred upon any one to make gas.

From these considerations it appears that the exclusive right of the plaintiff to make gas in the city of New Orleans is void, because there is no public necessity for it. The Crescent City Company has the undoubted right to make and vend gas from and after the date at which their rights accrue, and to that extent their charter appears to be good and valid. The defendant has the same right by the extension of their charter for twenty years, with the exclusive privilege taken away.

Judgment for the defendant.

Water as Fuel.

A correspondent, Dr. A. A. Hayes, writes to say that recently two similar boilers were employed with widely different results as to consumption of fuel. On investigation it was found that, with the deficient boiler, "the workmen had been restricted to about twenty inches in draft of ash pit; the other furnace had a vault, permitting ashes and cinders to be retained for several days, while here the paved, clean floor formed the bottom of the ash pit. The fuel was remarkable for purity, and so compact as to be kindled with difficulty. On opening sight holes, the fire could be seen burning intensely; the radiant heat appeared to be absorbed; very slight flame only could be seen, but the rush of highly heated air was constant. After some time, observation showed that the ash pit was the only point on which suggestion could be excited, the matter of quality of fuel being in favor of the bad furnace. A casual observation had shown that the ashes of the good furnace were damp. The pavement of the room and the ashes were accordingly wetted on the ash pit floor. Immediately flame appeared at the door joints, and from the cracks (from unequal expansion); the damper was hurriedly raised to allow the great volume of combustible matter to reach the chimney. The pressure gauge partook of the new life, and soon an over abundance of steam was formed. After the adjustments were made for using the steam, and a very little water was constantly admitted to the ashes, more than the necessary quantity of steam was afforded by the boiler, while the consumption of fuel was not increased. It will be inferred that, under conditions not unusual, a great economical gain resulted from the use of a portion of the heat of contact in decomposing vapor, or in heating steam so highly that it transported carbon to form flame; the result was the conversion of an imperfect to an efficient apparatus, without added expense, in opposition to a theoretical law.

In numerous cases continued through many years of observation, I have seen similar results follow the use of moist air in the combustion of dry anthracite; but this case is considered exceptional from the accuracy of the proofs afforded.

In reviewing these facts, it will be seen that a useless apparatus was rendered thoroughly efficient by forming flame from the otherwise ignited fuel. More importance than appears belonged to the trials, for on the success thus obtained grew up a most extended application of steam, where every point connected with its use is registered with the precision of philosophical apparatus.

A doubt in regard to the consumption of fuel has probably been present in some minds. How could the fuel be consumed, and vivid combustion maintained, without a corresponding production of steam? The answer is founded, not on observation alone, but on experiments. In a cold, dry atmosphere, the best anthracites produce so intense a radiant heat that near by surfaces of iron become heated above the temperature of economical rapid evaporation That kind of fuel, too, affording no flame in cold dry air, requires more than double the theoretical amount of oxygen for its combustion; and this volume of heated air and products of combustion is far less hot than flame, and is repelled by the parts of the boiler behind the space over the mass of glowing fuel, as less highly heated gases are always repelled by colder surfaces. In fact the steam generating surface was so far reduced in area as to render it impossible for steam te be formed in time, and the heat was wasted.

My wish is to see more attention given to flame fuel, as contrasted with radiant heat fuel, not only as a facile and economical application, but as a check to the use of old devices which waste the fuel. A long step in this direction has been taken in heating gas retorts. Apart from great economy, the destruction and wear of apparatus is reduced, as they may be in steam production."—*Sci. Am.*

Gas-Light Association of the United States.

OPENING ADDRESS OF THE ACTING PRESIDENT, MR. W. H. PRICE, PRESIDENT OF THE CLEVELAND GAS-LIGHT COMPANY.

PROCEEDINGS OF THE SECOND SEMI-ANNUAL MEETING OF THE GAS-LIGHT ASSOCIATION OF THE UNITED STATES, HELD IN CLEVELAND MAY 13, 1874.

In the absence of the President, General Roome of New York, the meeting was opened with the following words by Mr. P. E. Demill of Detroit:

Gentlemen: The time has arrived for which the meeting has been called, and the Association has honored me with two other offices besides that of Vice-President, the duties of which will require all my time. I therefore call Mr. Price of Cleveland, the second Vice-President, to the chair.

Mr. W. H. Price then took the chair, and spoke as follows:

The Association will please come to order. I presume no one will regret more than myself, that our accomplished President is absent; he has not returned from Europe. I also regret that Mr. Demill is so engaged that he cannot take charge of the Presidency and conduct your deliberations; but relying upon your forbearance, I will endeavor to do as well as I can in this position.

This Association has grown out of a necessity which has been felt, and which arose mainly from the fact that there is a very great dearth of educated gas engineers and gas managers in this country. We have no schools, no associations, no arrangements made by which that body of men which is called upon to build and to manage gas works, can be educated. Nearly all of us, I presume, have come into this specialty in a certain sense accidentally. I presume we have present with us some who have been educated to the profession; but I speak in general terms. It has been long felt to be a necessity that we should associate together, for the purpose of combining what knowledge and what experience we have acquired in perfecting ourselves in the art and science of making and distributing illuminating gas. This Association is entirely and strictly for mutual improvement, and has no other purpose. As the cities and towns of this country have grown and developed, gas companies have been organized, and now no town having a sufficient size or sufficient population, can afford to do without gas works. Nearly every little town in the Northern, and many of the Southern States is supplied with gas companies and gas works. This interest has become large, and it seems necessary that it should be developed in the best possible manner; and this can only be done by meeting occasionally and comparing our views, our theories, and experiences. We are all confronted at every step by difficulties. The gas manager lives too much isolated. Nearly all of his time he is confined to his works. He travels too little, learns little of the experiences of others, and hence he is very apt to run in the rut in which he started. Perhaps the party who first built the works gave it a certain cast, a certain direction, and year after year it runs in that same rut, without making any expansion.

Now this society has been organized to get ourselves out of all ruts; to learn what are the best methods of construction, and the best methods of applying labor and manipulating material, so as to give our towns and cities the best quality of gas at the lowest price.

We are constantly assailed by those who wish to sell us patents to revolutionize the whole system of gas-making. While on the one hand we should not shut our eyes to all proper improvements, yet on the other hand we should be careful not to take in at once everything that is claimed to be an improvement. We have associated together for the purpose of carefully discussing and investigating the claims of these different improvements. Many of them are old and have been two or three times exploded, but are occasionally revamped and brought forward.

When this Association was organized it was on a broad basis. It was to consider all claims of materials to be used, and the best methods of using them. I hope we have come together in a liberal spirit, and with a determination to sit here long enough to listen to the articles that have been prepared, and to engage in the discussions which shall grow out of them, and to gather up as much as we can of experience and knowledge, to be used in the interest of our companies at home.

I do not propose extended remarks. This position has been assigned me very unexpectedly; and without detaining you longer, I now announce the meeting opened and ready for business.

Domestic Water Supply.

Dr. Van der Weyde quotes approvingly, from a source unstated, the following. We fear the "girls of the period" too often know little and care less about "the supply of water in the kitchen." Would it not serve a better purpose to put the case to the other partners in the firm. Let a man refrain from marrying a girl, etc. He wouldn't refrain, however, particularly:

"Let nobody be deterred from bringing water in the house by any fears of failure and perplexity. You might just as well stop the circulation of blood in the body, because it is subject to derangement, as to refuse the circulation of water in the house because now and then a pipe overflows, and your frescoes are ruined. Good workmen will prevent any such accident, but if they cannot, give up your frescoes; do not give up your life blood. When I see the farmhouses, the dairies, the kitchen, whose only source of supply is the well in the yard, or the hogshead at the back door, how life would be lengthened and sweetened if all this heavy, and hard and slow water-bringing could be supplanted by a turn of a screw. I wonder that we do not manage to introduce it, somehow, into our marriage contracts. What an increase of vital force would ensue; what a diminished demand for divorce; what a strengthening and upbuilding of the family bond, if a girl should refuse to marry until there was an inexhaustible supply of water, at least in the kitchen. A house without water-works ought to be considered as incomplete as a house without doors, and as incomplete in the country as in the city"

Bergen Hill Tunnel.—Work on the Bergen Hill tunnel, for the Delaware, Lackawanna and Western Railroad, has been lately commenced in earnest. Seven shafts are to be sunk, and 500 men kept at work day and night. The tunnel begins on the east side at the head of Ferry street, Hoboken, and will be considerably above the Erie tunnel. The track will be elevated above the Erie road, at the west end, on a trestle, thus avoiding the danger and delay of crossing. It will take two and a half or three years to complete the tunnel.—*Scientific American.*

Pipe-Way Transportation.

"Plpe-way transportation is coming into favor in the oil regions of Pennsylvania, to carry petroleum from the wells to stations on the railway. The longest pipe-way is fifteen miles, overcoming 400 feet of elevation by steam pressure at the entrance to the tube. This system of transportatien is so independent of weather and bad roads, and so preventive of leakage, and gives so thorough satisfaction without any draw backs, that public attention is directed to many other practical applications of the same system.

"Twenty-five years ago, on the national road, between Cumberland and the bituminous coal-field beyond, we saw a small rivulet turned to similar account in the cheap transportation of coal. A zigzag half-inch board flume followed the tortuous course of the petty stream and carried six inches depth of water and twelve inch surface. A dam collected water enough to make two runs of coal a day. Each run bore in its current 30 tons of coal, fed from a chute with a rake. The distance was under five miles; the fall was at least 20 feet to the mile. The coal floated along with ease, carrying with it chunks of slate and conglomerate rock. There were chutes for its reception on the turnpike. These had screens, over which the coal wasted, being perfectly cleansed and polished before entering. All day long wagons were self-loading under these chutes. The cost of transportation over the water-way was merely nominal. It was an easy step for invention to suggest pipe-ways, for similar transportation of fluids; and for mails and packages, by pressure of condensed air, as now used in London.

"It is not generally known that in France the pipe-way system has been used for ten years past in transporting beet juice from the field to the sugaries. The sugaries at Cambria work up annually 246,000 tons of beets; they are supplied with beet juice through 62 miles of pipe, now being extended to 100 miles, in many ramifications.

"At points central to cultivation, works are erected for rasping beets and expressing the juice. Milk of lime is immediately added to prevent decomposition: and after inspection and measurement the saccharine stream is turned into the pipe-way and delivered at the terminal sugaries, the long contact with lime and the thorough agitation purifying the juice more perfectly than usual. It is estimated that during 1874 there will be a total length of such pipe-ways of 560 miles, doing service between the scattered beet fields and the condensed sugarie works of France.

"The pipes are placed two feet eight inches below the surface, and steam engines compress the air as desired. All degrees of elevation are thus surmounted. The juice has a gravity of one degree Baume on entering, and the same when discharged.

"This pipe-way system so economises sugar-making that it wonderfully multiplies the sugaries. No investment excels that concerned in this production. Farmers find it far better than other crops. Pipe-way stocks are in high favor, and sugaries pay best of all."—*Mining and Scientific Press.*

Notes on Petroleum-Gas Making,

[From the National Oil Journal.]

It seems to be unfortunate for the advancement of petroleum gas into more general use, that no process or system, however crude or unscientific, can well fail to achieve a certain degree of success, and to produce results which, while the apparatus is new, or carefully manipulated, are sufficient to deceive a person unacquainted with gas making. A single plain retort of almost any size or shape will, while it is kept clean and carefully worked on short runs, come as near to filling the "guaranteed" performances of the generality of petroleum gas works as they themselves will.

Another point to which I desire to call attention is that, in statements of results obtained from petroleum gas making and burning, it is not possible to give them with the absolute and unvarying accuracy usually claimed. Even though the quality and quantity of the material, and of the decomposing heat *are controlled with absolute uniformity*, the expansion and contraction in volume, by changes of temperature in the gasometer, are sufficient to materially affect estimates of the candle power. The contraction and expansion being about one per cent. for every three degrees change of temperature, it follows that 1000 feet of gas measured with the thermometer at 32° would increase by expansion to 1,100 feet at 62°, and yet would contain exactly the same elements *and give just the same aggregate light*, being of 80 candle gas at 32° only 73 candle gas at 62°. Their apparent difference, amounting to 10 per cent. in the yield, is liable to occur frequently in actual practice, and, if taken advantage of, will tend materially to cover over statements.

When gas is made and stored at a temperature above 62° it is very liable to carry with it, if not well made, a considerable proportion of petroleum vapors, which will condense upon becoming colder, and so make the contraction still greater, and, to the extent of the condensed vapor, irrecoverable.

In making gas, the cruder the apparatus used the more probable is the obtaining of a *large yield in cubic feet but not in light.*

A common gas retort, at high heat, and a workman of little skill, can easily get 80 to 100 or more feet of gas from a gallon of oil, *and yet waste the bulk of its lighting power.* But it takes a scientific arrangement and a skillful workman to get 50 or 60 feet as the entire yield of a gallon of oil, *and yet representing its entire lighting power.* The difference in favor of the latter being that the gas thus made will give a magnificent light for a consumption of one foot per hour, while the other will give an ordinary light for a consumption of four feet per hour, and will leave the greater portion of its lighting power to choke the retort and pipes in the form of carbon.

J. Desha Patton.

Statement.

Exhibiting the comparative price of Gas to Consumers and Street Lamps in different Cities of the United States ahd Canada.

Cities.	Per 1000 cu. ft. to consumers.	Lamps per annum.	Lamps ₱ 1000 cu. feet.	Size of burners ₱ hour.
Albany.....	2.50	34.65	.....	4 feet.
Baltimore*....	2.75	.....	2.50	6½ "
Boston.....	2.50	31.90	.....	4 "
Chicago.....	3.37½	.....	2.50	5 "
Cleveland.....	2.50	28.72	.....	4½ "
Concord.....	3.20	32.00	.....	4 "
Harlem.....	3.00	39.00	.....	3 "
Lowell	2.75	.....	2.50	.....
Manchester...	2.70	.....	2.70	4 feet.
New York.....	2.75	.....	2.75	3½ "
New Orleans.	3.00	45.00	.....	4 "
Oswego†.....	3.50	.....	2.75	5 "
Roches'el‖.....	3.50	25.00	.....	.....
St. Louis.....	3.25	37.00	.....	5 feet.
Syracuse.....	3.25	.....	2.50	4½ "
Troy.....	3.25	.....	3.00	3½ "
Washington‡.	2.56	.....	3.56	5 "
Hamilton‖.....	3.00	15.00	.....	2½ "
Kingston.....	3.50	13.00	.....	3½ "
London.....	3.00	22.00	.....	2½ "
Montreal§.....	2.60	22.00	.....	4½ "
Quebec.....	2.80	23.00	.....	2½ and 3 ft.
Toronto¶.....	2.50	19.00	.....	2½ "

* City paying expenses of lamplighting, etc.
† City paying expenses of lighting and repairs.
‡ City paying lighting and repairs.
‖ Small burners and gas only of 12 candles.
§ Gas of 16 and 17 candles.
¶ Small burners and gas of 12 candles.
—*Mr. Cathels, of Montreal.*

Gas for the Parks.—Six proposals for furnishing gas for the parks and squares of the city were opened by the Park Commissioners March 18, Comptroller Green being present. The New York Gas-Light Company proposed to furnish the parks south of Grand street at $38 per lamp per year. The Harlem Gas-Light Company asked $3.25 per lamp per month north of Seventy-ninth street. The Metropolitan $31 per lamp per year between Seventy-ninth and Thirty-fourth streets. The New York Mutual $29.50 per lamp per year between Thirty-fourth street and Cooper Institute, and the Manhattan $33 per mlap per year between Thirty-fourth and Grand streets. The New York Mutual also made a conditional proposal for lighting Tompkins square.

American Water-Gas Researches.

REPORT OF PROFESSORS SILLIMAN AND WURTZ.

[Continued from page 149, No. 9.]

PERMANENCE OF THE HYDROCARBON GAS UNDER THE INFLUENCE OF COLD, IN CONTRAST WITH GAS MADE BY THE COMMON PROCESS.

A very natural doubt has existed in the minds of some of our best gas engineers whether the hydrocarbon gas could have the same permanence under the influence of low temperatures as ordinary coal gas. Considering the ease with which air, or even poor coal gas which has been naphthalised, parts with an important portion of its illuminants at a low temperature, it has been argued that the non-luminous substratum of combustible gases, got from water by the hydrocarbon process, would in like manner part company with the illuminants derived from the bituminous coal distillation as soon as the mixture should be powerfully refrigerated.

Experiment, before which all preconceived notions must bow, completely disproves this hypothesis, and we are able to declare most positively that the hydrocarbon gas is far more permanent under the influence of extreme cold than any coal-gas we have been able to put to the same severe test.

Let us state the evidence.

1. We had occasion carefully to examine the effect of the exposure of the gas in the holder at Fair Haven to the action of cold weather for a period of three weeks. The facts are as follows:

From the 28th of December to the 9th of January last, the volume of gas remaining in the holder (abont 25,000 cubic feet) was exposed to severe cold, the temperature having been as low as 12° F., without sensible loss in bulk beyond the amount accounted for by consumption about the works, and with no loss whatever in its illuminating power. The average of nine days photometric observations, after the gas was thus exposed, showed an illuminating power of 16·21 candles. Refer, for more complete illustration of this curious fact, to Table XV., on page 97, which shows an increase of illuminants, taken up from the saturated water of the tank during the latter part of this period; the illuminating power at the beginning of the period having been but 15·66 candles.

Gas engineers will see that this test, of long continued exposure to cold, is of the greatest practical importance, as proving beyond cavil the permanence of the gas; showing that it is not, as has been asserted by some, merely a poor gas naphthalized by the condensable oils of coal tar, and therefore liable to be again impoverished by cold and exposure.

2. Conceiving that the use of a lower temperature might give different results, the gas, on the 23d of March, made from Westmoreland coal 85 per cent., and Albert 15 per cent., was subjected to refrigeration in a coil of half-inch lead-pipe 50 feet long, immersed in a freezing mixture of ice and salt, at a temperature of 0° to—6° Fah.

At 60° F. the gas had candle power of 20·02 candles.
At 0° to 7° F. the gas had a candle power of..... 18·42 "

Loss of candle power 8 per cent., or... 1·60

In a second experiment the following results were obtained:

At 60° F. the gas had a candle power of 19·38 candles
At 0° to 6° F. the gas had a candle power of..... 18·79 "

Loss of candle power 3 per cent., or... 0·59
Average loss of illuminating power, 5½ per cent.

3. By the kiudness of Mr. Sabbaton, the skilful Engineer of the Manhattan Gas Light Co. in New York, we were enabled to repeat this test with a similar coil in the Eighteenth-Street Station of that Co. The first trial was upon the gas from Peytona cannel.

At 60° F. this gas had candle power of 29·24 candles,
" 0° to—6° " " " " 27·30 "

Loss in illuminating power 6·6 p. c. or 1·94 "

The second trial was on the street gas of that Company on the 24th of March.

At 60° F. the gas had candle power of 14·71 candles.
" 0° to—6° " " " " 10·42 "

Loss in illuminating power 41·19 p c or 4·29 "

Anxious to avoid any error in respect to results so unexpected and remarkable, it was requested that the trials might be repeated with great care by Mr. Farmer, their own photometric observer; which was accordingly done, with the following results:

4. Another sample of the gas from Peytona cannel (the same mentioned on page —) of a higher candle power was used.

At 60° F. in fishtail burner the gas had 41·16 c. power
At 6°F. in fishtail burner the gas had. 35·99 "

Loss of illuminating power 12·5 p c or 5·17 "

5. The street gas, March 29; tried again.

At 45° F. the gas had an illuminating power of..... 14·05 candles.
At —6° " " " " 7·84 "

Loss of illuminating power 44 p. c., or 6·21 "

6. The same gas at +14° Fahr. lost 12·5 per cent., or 1·77 candles; showing that the great loss in illuminating power was with temperatures below 14° F.

These trials were also extended to the gases from the coals then in use at the Manhattan works, taken separately; with a view to determine whether the loss was chargeable possibly to one, more than another of the constituent coals. These were: "Penn" or Northwestern coal from Southwestern Pennsylvania (essentially the same as Westmoreland), forming $\frac{2}{3}$; and Cow Bay, Nova Scotia, forming $\frac{1}{3}$ of the mixture in use to produce the gas tried in Experiment No 5 above.

7. March 21; Northwestern Coal ("Penn"):

At 60° F. the gas had an illuminating power of..... 16 candles.
At —6° the gas had an illuminating power of..... 9·93 candles.

Loss of illuminating power, 38 p c or. 6·07

8. The same gas tested:

At +15° F. lost 8·8 per cent., or..... 1·41

9. Cow Bay ("Blockhouse Coal"):

April 5th; coal which had been 12 months exposed and had lost in quality:

At 65° F. the gas had an illuminating power of..... 14·99 candles.
At —6° F. the gas had an illuminating power on..... 10·91 "

Loss of illuminating power, 24·3 per cent., or..... 4·08 "

10. The same gas at 15°, lost 6·7 per cent., or 1·01 candles.

Still further to test the comparative value of the two systems of gas making, with reference to the permanence of the products under extreme cold the experiments were repeated at Fair Haven with the hydrocarbon process upon Blockhouse coal, with 10 per cent. of Albert.

11. Blockhouse coal, Cow Bay, N. S.. 90 per cent.
Albertite, Hillsboro, New Brunswick. 10 "

At 60° the gas had an illuminating power of..... 15·83 candles.
At —6° F. the gas had an illuminating power of..... 13·54 "

Loss of illuminating power, 16·15 per cent., or..... 2·29 "

12. Second trial of the same gas:

At 60° F., the illuminating power was 15·93 candles.
" —6° F. " " " 14 02

Loss of illuminating power 12 p. c., or 1·91 "

13. The Westmoreland coal, Pennsylvania;

At 60° F., the gas had an illuminating power of..... 15·06 candles.
At —6° the gas had an illuminating power of..... 11·39 "

Loss of illuminating power 24·3 p. c. or 3·67 candles.

14. The same gas at 15° F., lost 10·6 per cent., or 1·61 candles.

The conclusion to be drawn from these repeated trials is greatly in favor of the superior permanency of the hydrocarbon gas, as compared with gas made from the same coals by the ordinary process.

These results are more conspicuously exhibited in the following Table:

TABLE IV.

SHOWING THE LOSS OF ILLUMINATING POWER IN ILLUMINATING GAS BY REFRIGERATION AT 15° AND 0° TO —6°

A. *Gas made by ordinary process.*

GAS MADE FROM	CANDLE POWER, AT		LOSS OF ILLUMINATING POWER.		CANDLE POWER, AT		LOSS OF ILLUMINATING POWER.	
	60° F.	0° to —6°	In candles.	Per cent.	60° F	15°.	In candles.	Per Ct.
Peytona Cannel.....	29.24	27.30	1.94	6.60	.....	.....	.....	.....
Peytona Cannel.....	41.16	35.99	5.17	12.5	.....	.....	.....	.....
Westmoreland, Blockhouse, ...	14.71	10.42	4.29	41.19	.....	.....	.....	.....
Westmoreland, Blockhouse, ...	14.05	7.84	6.21	44	14.05	12.29	1.76	12.5
N. Western, "Penn"	16.	9.93	6.07	38	16.	14.59	1.41	8.8
Cow Bay, N. S., Blockhouse, ...	14.99	10.91	4.08	27.2	14.99	13.98	1.01	6.7
Westmoreland, Pa.....	15.06	11.39	3.67	24.3	15.06	13.45	1.61	10.6

B. *Gas made by hydrocarbon process.*

Westmoreland, 85 / Albert, 15	20.02	18.42	1.60	8	Note.—No trials were made with the hydrocarbon gas at 15°. But 25,000 feet exposed in a holder for three weeks, at temperatures ranging from 32° to 12°, suffered no loss of illuminant power.
The same coals.....	19.38	18.79	0.59	3	
Blockhouse, 90 / Albert, 16	15.83	13.54	2.29	14	
The same coals.....	15.93	14.02	1.91	12	

Average loss in illuminating power at zero to —6° on street gas by common process..... 32·53 per cent
Average loss in illuminating power at zero to—6° on street gas by hydrocarbon process..... 9·25 "

Difference in favor of hydrocarbon process (equal 2·63 : 1)..... 23·28

Average loss on Peytona cannel at zero 9·32
Average loss on New York street gas, old process, at 14° and 15° Fahr.... 9·55

In view of these remarkable results, it must be admitted that the hydrocarbon process imparts to the illuminants, which its substratum of non-illuminating gases holds in solution, a degree of permanence unknown in street gas made from identical coals by the common process. We do not here attempt to account for this; but the fact is of the highest importance, and completely removes one of the most plausible of the objections that have been urged against the hydrocarbon process.*

* A considerable number of additional results upon this subject have been obtained, but as they serve only to confirm the statements made in the text, the details are reserved for another occasion.

Mammoth Coal Vein in India.

We have often called the attention of our readers to the rich stores of practical and theoretical knowledge at their command if they consult the periodical publications of the very numerous learned societies in Europe and America. Little of this finds its way into the daily press or monthly magazines, or even into text-books for students, and this little only after years of silence, when the matter is of stale interest.

We were looking over the pages of the Journal of the Royal Geological Society the other day, vol. XIII, part 3, and found among its numerous memoirs, a description of a colossal coal bed, exceeding in size our Mammoth Bed at Pottsville and Mauch Chunk, and comparable only with the great Dekazeville coal bed in the south of France.

The outcrop of the bed where measured is about half a mile below the village of Korba, in the Chuteesgurh Province. It is impossible to measure it with precision, the dip varying from 13° to 18°, and the strike from S. 60° E. to S. 74° E. at the two ends of the exposure. The horizontal breadth of the out crop is 350 feet! which, with an average dip of 15°, would make the bed 90 feet thick; and Mr. Blanford, of the Indian Survey, thinks this to be rather below than above the truth. Massive feldspathic sandstones occur both over and under it; 400 feet of them being visible over it.

A section of the bed is given, measuring 89 feet, o which fair coal makes 50 feet.

Some pyrites are found, but not throughout the mass. The coal ignites readily and burns with more flame than usual with outcrop coal in India.

About 300 yards higher up the river about 50 feet of the coal bed crops out, distinctly faulted against the roof sandstones of the other exposure, but neither the top nor the bottom of the bed is visible. East and west the range extends for a great distance. An assay gives—

Maximum of carbon..... 60·5
Minimum of carbon..... 32·8
Average of carbon..... 46·6

—Professor J. P. Lesley, in *U. S. R. R. and Mining Register.*

Gas Explosion in a Church.

An explosion occurred April 19th, in a church in Jersey City, which destroyed a large portion of the ceiling of the vestibule upstairs. Previously a couple of workmen renovated the old organ located in the gallery of the church. The gas pipes which ran through the organ were cut off below the flooring, and were carelessly left uncapped. Last evening, Mr. George Mount, the sexton of the church, turned on the gas and proceeded to light up the edifice. Upon ascending to the gallery with a lighted taper in his hand, the volume of gas which had escaped from the open pipes took fire, and in an instant there was a terrific explosion between the gallery flooring and the ceiling below. Happily the ceiling gave way, and the force of the explosion was spent in a downward direction. Mr. Mount luckily escaped with only a loss of eyebrows, eyelashes, and whiskers. The man who left the plugs open cannot be too severely reprimanded. They could easily have placed a cap over the pipe, and thus stopped it up. The damage to the church is considerable. The services were performed in semi-darkness, as it was impossible to light the gallery jets. —*Jersey City Journal.*

[*For other reading matter, see page* 172.]

THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY.
Publishing Office, No. 42 Pine Street.

PUBLISHED ON THE 2ND AND 16TH OF EACH MONTH
At No. 42 Pine Street, New York.

A. M. CALLENDER & CO.,
PROPRIETORS.

EDITOR---PROF. HENRY WURTZ.
Editor's Private Office, 12 Hudson Terrace, Hoboken, N. J.
(Immediately fronting the Ferry Houses.)

This is a recognized official organ of—
LIGHT, HEAT, MINING INTERESTS, STEAM, WATER-SUPPLY, PATENTED INVENTIONS, VENTILATION, SANITARY IMPOVEMENT, AND GENERAL CHEMICAL SCIENCE.

TERMS

SUBSCRIPTION—Three Dollars per annum, in advance.

AGENTS:

NEW YORK—AMERICAN NEWS COMPANY, 119 and 121 Nassau St
BOSTON—S. M. PETTENGILL & Co., 6 State Street.
PHILADELPHIA—COE, WETHERILL & Co., Ledger Buildings, Phila.
Germany—B. WESTERMANN & Co., of New York.
Great Britain—TRUBNER & Co., 60 Paternoster Row, London.

☞ All communications to be addressed to "**The Proprietors,**" No. 42 Pine Street, Room 18, New York.

SATURDAY, MAY 16, 1874.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 11 and 121 Nassau street, New York agents for this Journal. News dealers will please send orders to them.

NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER, The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

CONTENTS.

☞ An asterisk (*) denotes an illustrated article.

Canal Navigation in Winter—Gas Wells.....163
Chemical Excerpts.....164
Consumption of Coal in the United States in 1873.....165
Explanatory Regarding "Wollongong".....165
The New Orleans Gas Case Decided.....166
Water vs. Fuel.....167
Gas Light Association of the United States.....167
Domestic Water Supply.....167
Bergen Hill Tunnel.....167
Pipe-Way Transportation.....168
Notes on Petroleum-Gas Making.....168
Statement.....168
Gas for the Parks.....168
American Water Gas Researches.....168
Mammoth Coal Vein in India.....169
Gas Explosion in a Church.....169
EDITORIALS—
Mr. Price's Address to the Association.....170
A Chemical Centennial.....170
Gas Wells in New York.....170
Patent-Law Tinkering.....171
The Cas Litigation in New Orleans.....171
CORRESPONDENCE—
Centennial of Chemistry.....172
Cannelton Cannel.....172
Gas in Stamboul.....172

MR. PRICE'S ADDRESS TO THE ASSOCIATION.

A slight delay has occurred in the appearance of this issue; which we think will be considered justifiable—as it originated from the desire to hear from the meeting of the Gas-Light Association at Cleveland. We are thus enabled to put before our readers the very interesting and appropriate opening address of Mr. Price, who, as Vice President, occupied the chair.

Mr. Price refers to the general lack of scientfic training, on the part of the mass of those entrusted with the conduct of gas-making in the United States, and to the lack even of the means of acquiring such training in an efficient and systematic way; and speaks of the necessity of combination in the gas profession, such as the Association will secure, to facilitate the attainment of knowledge.

The animus and the substance of Mr. Price's address, prove this gentleman to entertain advanced ideas of the true modes of attaining to such knowledge, and keeping parallel with the march of science and civilization.

We think that his views will be recognized as having been repeatedly embodied in the editorial columns of this Journal. We feel therefore that we have reason and right to congratulate our readers and ourselves that we have surely not been in the wrong path—when a leading man in the profession, of such intelligence, experience and influence as Mr. Price, takes such public occasion to promulgate these advanced views. It encourages us to think that the time may be at hand when the gas fraternity of America, as a body, will throw its energies into this matter, and, no longer satisfied with a supine waiting upon events, will demand that measures be taken to educate the profession up to the high mark which its usefulness to the public and its dignity appear to us to demand.

Reports, in detail, of the proceedings of the Association, will reach us duly, and will appear in our succeeding issues.

A CHEMICAL CENTENNIAL.

In our Correspondence, to day, will be found a remarkable proposition, originating with Professor H. Carrington Bolton, of Columbia College, New York. Professor Bolton has already sent the same to the *American Chemist*, and, we believe, to some other Journals. The call speaks for itself, except as to one point point probably. This is why should *American* chemists especially be called on to conduct such a celebration. The strong and significant reason for this is but alluded, to and that without the detail we should have preferred. It is stated that on August 1st, 1874, Priestley discovered oxygen; but it might have been added that the burial-place of this illustrious English chemist of the last century, lies within the limits of the United States, on the banks of the beautiful Susquehanna, at the town of Northumberland in Pennsylvania, adopted by Priestley as his home for many years previous to his death, which occurred in one of the earlier years of the present century.

It is this fact that appears to our mind to impart a considerable measure of propriety to an American celebration of this sort, and if, in addition, the place for the celebration were to be decided on with reference to the grave of Priestley—that is, if the place appointed for this event were to be near that grave itself—an amount of significance and even of historical interest would be implied, which would doubtless at once engage the attention of all American chemists. The selection of that locality, therefore, instead of Hartford, which has been spoken of, we would urge upon the movers of this undertaking; being sure that the occasion would then be one which would mark an epoch in the progress of American chemistry.

LATER.—Since the above has been in type, a committee of five Chemists, from the New York Lyceum of Natural History, has been charged with the duty of organizing this Centennial Celebration. This committee is composed of Dr. Bolton as chairman, with Professors Chandler, Leeds, Seely, and Wurtz. Our readers will be advised of progress.

GAS-WELLS IN NEW YORK.

It is now several years since a belief was set forth, editorially, in the columns of this Journal—as in a matter already virtually demonstrated—that throughout vast districts of the United States, "an immense number of fountains of natural gas may be developed; furnishing a fuel which is independent of seasons, circumstances, miner's strikes, railroad monopolists, etc., etc."

The rich State of New York is probably in condition to give (indeed to *owe*) more attention to this subject than any other section of the United States; although *all* of our people are interested in it, more or less, directly or indirectly. New York, however, a State which, while so highly endowed in other respects, and so populous, is altogether destitute of coal–that mineral to which the future of our country looks with such expectant eyes—abounds in geological formations known to be charged—under an enormous pressure—with these combustible gases. When it is taken into consideration that the expansive force that dwells in the gas as found, is so great that this alone will propel it, after it reaches the surface, to the distance of many miles from its point of issue, in any required direction, we have no hesitation in assserting that the portion of the surface of New York State where the gas may be found—in one or more of the three (or more) horizons of rocks charged with it—within available distance, is at least one fourth of the area, or say 12000 square miles; and this mostly situated in the well cultivated and populated parts of the state. In this area should be comprised the whole of the middle tier and a considerable part of the Southern tier of counties from east to west, from Lake Erie to the Catskills.

Whether it may also occur in the thinner continuations of the beds of the Hamilton group, which underlie the Catskills, and crop out all around their eastern and northern flanks, following along near and parallel to the tide-water of our Hudson estuary itself; is another question, which we here throw out for the first time, and which we shall hope soon to see solved. Wells bored close to the eastern base of the Catskills—or, better, in the bottoms of gorges that penetrate this chain—would decide the question. It is to be remembered, as already shown by us, that we cannot expect to find any gas remaining, or certainly not under any important tension, near the *outcroppings* of the gas-bearing beds.

In this issue, Mr. Charles Plagge—to whose suggestion that the gas of the wells should be used as fuel for warming the water of the Erie canal and keeping it open during winter, we have already directed attention—favors us with a communication on the subject. Mr. Plagge, who, we understand, is a gentleman of scientific training, claiming the illustrious Liebig as his

preceptor in chemistry, proposes to call the attention of capitalists and publicists, and through them, of the people of New York State generally, to the great source of wealth, power and comfort, which is here awaiting development, for their benefit.

It seems clear that this is a matter of such general public interest that it would be just that Mr. Plagge should receive, in his undertaking, the help and encouragement of all progressive men; and we trust therefore that he may soon bring things into shape so that test-wells for gas may be sunk in all parts of the State where there is a geological probability of finding a copious flow. Success in developing large outflow of natural gas in many places, would be quickly followed by the devisal and perfecting of methods for employing this agent, to accomplish results which will not be among the least of the triumphs of Man over Nature in which this Century has been so fertile.

PATENT-LAW TINKERING.

In Great Britain, the strenuous and powerful movement, of a few years ago, to abrogate patents altogether, and to break down even the present precarious plank of safety that is trodden by men who seek to secure the offspring of their brains from being engulfed in the world's current, and passing from them altogether—this movement seems there to have died out, for the present at least. Curious is it to see that, through the influence apparently of one class—the agriculturists, who seem to have struck out the singular idea that students and thinkers have no rights they are bound to respect—a similar movement is now strongly under way with us. We are told that an Indiana politician at Washington, after trying first to have brainwork pronounced a legitimate object for promiscuous piracy, by Act of Congress; has found a slight stumbling block in the Constitution of the nation, and (besides what is doubtless to him more important and baffling) certain "prejudices" on the part of some fellow members in favor of right and justice—and has been obliged to modify.

He now proposes, in his modified bill, "to allow the inventor a monopoly, as at present, for two years, and then to grant him, on his application, an extended patent for fifteen years, on condition that any person may make and sell the patented articles on payment of a royalty of 10 per cent. to the patentee." We learn further, on newspaper authority, that petitions in favor of the bill "continue to arrive in large numbers by every mail, and its popularity appears to be pretty clearly established."

There is little danger in the above; the great principle remaining still untouched in the Constitution of the United States. The royalty provision would probably come to nothing in practice.

As we have said before, we say again that the needful thing is to have our present patent laws, which are wise in principle and in construction, strictly, faithfully and competently administered and executed; not by political tricksters, but by men of science and of conscience; and all things would then work together for good.

THE GAS-LITIGATION IN NEW ORLEANS.

We have given in this issue a large space to this subject, as we suppose that this sort of cases is likely to interest all our readers, of the profession at least. This has been a very remarkable case. It will be recollected that we gave to it a considerable space in former issues (June 2 and 16, and July 2, 1873).

At that time it was stated that the new Company, the Crescent City Gas-Light Company, had obtained a charter to light the city of New Orleans for *fifty years* from the date of the supposed expiration of the charter of the old New Orleans Gas-Light Company—having overlooked the fact that the latter Company had, in the interim (in 1860), in consideration of important concessions made to the city and new expenditures undertaken by that Company for the public benefit, secured a virtual extension of their charter for twenty years from 1875, or until 1895.

It was likewise stated that the Crescent City Company, on discovering this fact, had at once taken the ground that the supplementary act of 1860, extending the life of the old company, was null and void, for certain reasons maintained and proposed to be proved by them. The present suit, of which we have obtained the details, was to decide this point, among others. It appears that in the interval, however, two new parties had pitched into the affray, namely, the State of Louisiana and the City of New Orleans. The State made common cause with the new company, while the City made a grab, for its own behoof, in the hope of getting hold of the old works, and establishing a new case of municipal gas.

The sum and substance of the present development is that the old New Orleans Gas-Light Company is sustained on every point in all its rights, privileges and positions; and we are informed that much satisfaction is locally felt by such parties as have had experience of the just and liberal policy that has ruled the New Orleans Gas-Light Company, and of its excellent management in every way.

Prof. Henry Wurtz.

Scientific and Practical Chemist and Geologist.

Editor of "The Am. Gas-Light Journal."

PRIVATE OFFICE AND LABORATORY, 12 HUDSON TERRACE, HOBOKEN, N. J.

(First Block from the Ferry.)

Consultations in the city may be arranged by appointment, at the GAS LIGHT JOURNAL Office, 42 Pine street Room 18, or elsewhere. Address to private office.

Geological Explorations and Reports upon Coal Lands, and other Mineral Properties—Chemical Analyses—Advice and Investigations in all the Chemical Arts—Chemical Inventions and Improvements made.

Prof. W. makes a specialty of GAS CHEMISTRY, and the Analysis of Gas, Gas and other Coals, and Potable Waters. Has special laboratories and unequalled facilities for these purposes. Formerly Chemical Examiner in the U. S. Patent Office, and peculiarly competent as an

Expert in Patent Cases.

ROBUS, SIMPSON & ROBUS,

(Late of the CRYSTAL PALACE DISTRICT GAS WORKS, London, England, and the NEW CITY GAS WORKS, Montreal, Canada.)

CONTRACTORS FOR

Retort Setting and Fitting, and Main Laying.

☞ Retorts set on what is known as CATHELS'S PLAN FOR SETTING RETORTS.

Retort Setters sent to all parts of Europe and America.

Address

C. SIMPSON, 1 Robb's Block, Susan Street, Montreal. or F. & H. ROBUS, Bell Green, Lower Sydenham, Kent, England.

355-6m

GLOUCESTER IRON WORKS.

GLOUCESTER CITY, NEW JERSEY.

DAVID S. BROWN, Pres't. JAMES P. MICHELLON, Sec'y.
BENJ. CHEW, Treas. WILLIAM SEXTON, Sup't.

OFFICE, PHILADELPHIA,

No. 6 North Seventh St., (west side.)

CAST IRON GAS AND WATER PIPE

PIPE CAST VERTICAL.

1½ to 48 inches diameter.

Cast Iron Flange Heating and Steam Pipe.

STOP VALVES FOR WATER OR GAS, ALL SIZES.

Fire Hydrants,

GAS HOLDERS.

TELESCOPIC OR SINGLE.

☞ Castings and Wrought Iron Work of all kinds for Ga Works 253-6m

P.F. DEILY, *1842.* J. FOWLER. *1874.*

DEILY & FOWLER,

39 LAUREL STREET, PHILADELPHIA, PA.,

Builders of Gas Works.

MANUFACTURERS OF

GAS-HOLDERS,

Single and Telescopic.

WROUGHT IRON ROOF FRAMES,

COAL WAGONS,

COKE BARROWS,

AND ALL

Wrought Iron Work

CONNECTED WITH GAS WORKS.

☞ Particulur attention paid to Extensions and Repairs.

WANTED.

Four Good Second-hand Purifying Boxes,

about six feet square, with Condensers, and Centre Seal to fit the same. Address J. ZEHNER & CO.,
355-4t Tamaqua, Schuylkill Co., Pa.

FOR SALE.—GASOMETER, 7000 CUBIC FEET CAPACITY, in good order, ready for shipment.

DRY CENTER SEAL, six inch connections.

Four Round PURIFYING BOXES, four feet diameter, six inch connections, no covers or trays.

STATION METER, 30,000 cubic feet capacity, four inch connections. DANIEL BRAYTON, Sup't Gas Works,
357-4t North Bridgewater, Mass.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—ED.

Centennial of Chemistry, 1774-1874.

SCHOOL OF MINES, COLUMBIA COLLEGE.

Mr. Editor: The year 1774 was rendered memorable by great chemical activity. It is not possible to assign to chemistry any definite birth-year, but so many remarkable discoveries were made in 1774 that we may, with good reason, date the foundation of modern chemical science from that period.

It would be quite foreign to the object we have in view to give here any detailed account of the state of the science at the period referred to. We may mention, however, a few of the most important discoveries which made the year 1774 noted in the annals of Chemistry.

The eminent Swedish chemist, Scheele, first isolated chlorine, calling it, in accordance with the accepted theories of the day, "dephlogisticated muriatic acid." He also recognized baryta as a peculiar earth, and it henceforth took a place among the elementary substances. Scheele also published in this same year his masterly essay on manganese.

Lavoisier was engaged in an investigation of the cause of the increase in weight of tin when calcined in close vessels—a research which led him to subsequent discoveries of immense importance.

Wiegleb proved alkalies to be true natural constituents of plants. Cadet described an improved method of preparing sulphuric ether. Bergman showed the presence of carbonic acid in lead white. On the 27th of September in this year Comus reduced the "calces" of the six metals by means of the electric spark, before an astonished and delighted audience of savants. On the 1st of August, 1774, Priestley discovered oxygen, the immediate results of which were the overthrow of the time-honored phlogistic theory and the foundation of Chemistry on its present basis.

It surely requires no lengthy argument to prove that the year 1774 may well be considered as the starting-point of modern chemistry.

Now, Mr. Editor, I propose that some public recognition of this fact should be made this coming summer. Would it not be an agreeable event if American chemists should meet on the first day of August, 1874, at some pleasant watering-place, to discuss chemical questions, especially the wonderfully rapid progress of chemical science in the past hundred years?

Centennial celebrations are now in order. The Bostonians have renewed the memories of the Boston Tea-Party. Already the country resounds with preparations for a National Centennial in 1876. Why should not chemists meet to enjoy a social reunion in commemoration of events important alike to science and civilization? Should this proposed meeting receive your approbation, have the kindness to offer suggestions as to the proper method of bringing it before the scientific portion of the community. Details as to the place, etc., will naturally be deterred for the present.

Very truly yours,

H. CARRINGTON BOLTON.

[Communicated.]

Cannelton Cannel.

The advertisement of the Cannelton Coal Company, in another column, will have already called the attention of gas companies to the very valuable enricher, now being imported into this and the New England market from Western Virginia. The original analyses of this cannel, made in March, 1872, gave the following result, viz.:

Yield, per ton of 2440 lbs.

10,000 cubic feet of.....64 54 candles
12,025 " " .....05·60 "

Coke—32 bushels—weight 1320 lbs.—quite light—burns freely, making very hot fire.

5,238 cubic feet purified by one bushel of lime.

ANALYSIS AND TESTING OF

GAS-COALS.

Professor **WURTZ** desires to call the special attention of all engaged, and interested, in the **MANUFACTURE OF GAS**, or the **PURCHASE OR SALE OF GAS-COALS**, to his

GAS LABORATORY,

now the most complete one in the country, for the Testing and Complete Analysis of **GAS-COALS** and of **GASES.**

His Apparatus being all arranged at his own residence in Hoboken, and involving many improvements in construction and methods, he is enabled to make such Analyses at greatly reduced cost, and with the utmost promptness as to time, and reliability as to results.

S A M P L I N G

will be executed, or supervised—when desired—by Prof. WURTZ himself, at the Yard, on the Vessel, at the Mine, or elsewhere. INSTRUCTIONS FOR SAMPLING will be sent, when requested. Charges necessarily vary according to the amount of work done.

QUANTITY and CANDLE POWER of Gas only may be determined, or, in addition, determinations may be furnished of VOLATILE MATTER, COKE, and ASH, of SULPHUR in the COAL, COKE and GAS. Analyses made of the Gas also, and determinations of the DENSITY of the same and of its PERMANENCY under cold, time, and pressure. Elementary Analyses of Coals and experimental determinations of relative HEATING POWER.

Prof. WURTZ will also examine and report professionally and geologically upon tracts of Coal Lands.

Private Laboratory and Office,

No. 12 Hudson Terrace, Hoboken, N. J.

(CLOSELY ADJACENT TO THE FERRY HOUSES IN HOBOKEN)

These results were so far beyond those obtained from any American cannel, that it became a matter of interest to gas companies to ascertain whether they could be realized in practical use. In order to satisfy this desire, three cargoes were delivered to three different gas companies in New York, acting entirely independent of each other. The result of this practical test confirmed fully the expectations which the original analysis had raised, and led to immediate contracts for 15,000 tons, at a price very remunerative to the coal company, and at the same time satisfactory to the purchasers.

The facilities of the Cannelton Company, which far surpass those of any other mining company on the Chesapeake and Ohio Railroad, enabled them to fill all their contracts of 1873 promptly, and to the entire satisfaction of these customers. When the contracts for cannel supplies for the current year were under consideration by the gas companies in this city, their experience of 1873 in the use of the Cannelton cannel, and their confidence in the ability of the company to fill all contracts that they might enter into, together with the low price at which it could be delivered in this city, secured their orders for nearly 22,000 tons. The sales in New England and on the North River will increase the quantity to about 30,000 tons. While this success is mainly due to the fact that the Cannelton cannel is the best enricher for gas obtainable in the United States, it is also the natural result of the previous honorable manner in which the Cannelton Coal Company have transacted their business.

The agents of the Company in this city, and Boston, are Messrs. Bird, Perkins & Job.

Gas in Stamboul.

Gas-lighting is being introduced into Constantinople with all possible despatch. The *Levant Herald* says good progress is being made with the gas-works in course of construction at Yedi-Koule ("the Seven Towers"), with the gasometer, retorts, coal stores, and all other appliances, the mason work being already completed. A recent Fraissinet steamer from Marseilles brought a quantity of necessary material for the works, as also posts, lamps, gas-jets, reflectors, etc. Gas-piping is being laid in the principal thoroughfares, and as soon as the orders now being executed at the celebrated Creuzot foundry in France are finished, all will be in readiness. So that, unless some unforseen obstacle arise, there is every reason to believe that the Stamboul gas works will be in operation, and modern Byzantium lit with gas by the end of the year. A project is also on foot, according to the same authority, for renewing the rejected proposals for bringing a water supply to Pera from Stranja, and for connecting the great flow from that source with the unfinished bend of Ihsandere, which the contractors would undertake to complete. And a new Sanitary Commission proposes to submit to the Government a deliberately considered plan for the purification of the city. At a recent meeting it decided recommending an immediate improvement of the sewers, and the construction of butchers' slaughter houses outside the town.

LATER.—The preparations for lighting Stamboul with gas, says the *Levant Herald* of the 12th inst., are making rapid progress. All the fittings of the gasometer have been forwarded from the Creuzot factory to Marseilles for depatch to Constantinople, and the Prefecture of Stamboul has already received some 10,000 yards of gas-piping.—*Iron.*

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

MAY 16, 1874.

DELIVERED IN NEW YORK.

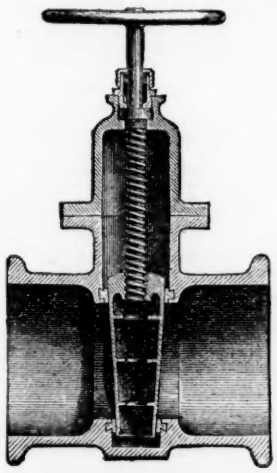
English Cannel.			
Ince Hall	$17 00	@	18 00
Kirkless Hall	16 50	@	17 00
English Caking Coals.			
Newcastle Gas	$12 00	@	00 00
Liverpool caking	11 50	@	12 00
British Province Coals.			
International—At Sydney, $2 50 in gold			— —
Block House—At Mines, $2 50, Gold		@	0 00
Little Glace Bay—At Mines, 2 50 Gold			— —
Pennsylvania Coals.			
Penn Gas Coal—At Amboy	$7 00	@	0 00
Westmoreland—At Amboy	7 00	@	0 00
(In New York both the above coals $7 50)			
Shafton	7 50	@	0 00
Youghiogheny	7 75	@	0 00
West Virginia Coals.			
MurphyRun	$7 40	@	0 00
Despard	7 40	@	0 00
West Fairmont	7 40	@	0 00
American Gas Coal	7 40	@	0 00
Fairmont	7 40	@	0 00
Newburgh Orrel	7 40	@	0 00
Pinnickinick	7 40	@	0 00
Cloverhill of Virginia	6 00	@	6 50
McKenzie Compound Mixture			— —
American Cannel Coals.			
Peytona of West Virginia	$12 50	@	00 00
Darlington of Pennsylvania			— —
Cannelton Cannel			12 50
Asphalts.			
Albertite of New Brunswick	$— 00	@	— 00
Ritchie Mineral of West Virginia	18 00	at Balt'e.	
Trinidad Bitumen	— —	@	14 05

CHAPMAN VALVE COMPANY.

MANUFACTURERS OF

CHAPMAN GAS VALVES.

Office and Sales Room 75 and 77 Kilby Street, Boston.

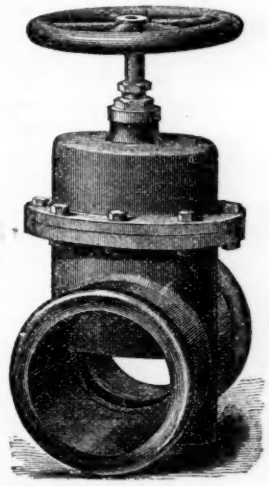


These Valves have been in use for several years, and are pronounced by all who have used them to be

The Best Gas Valves Ever Made.

They afford a direct passage the full size of the pipe. The seats are made of an alloy similar to BABBITT metal, specially prepared for the purpose, and superior to all other metals used for the seats of Gas Valves. It does not corrode under any circumstances to which it is exposed.

There is NO LIABILITY OF COHESION between the Gate and Seat, and the Valves can be relied upon to SHUT TIGHE and OPEN EASILY at all times—an important desideratum when used for street mains, in cases of fire.



We refer to the following named Gas-Light Companies among the many that have used these Valves:

BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CAMBRIDGE GAS-LIGHT COMPANY, CAMBRIDGE, MASS.
NEWTON & WATERTOWN GAS-LIGHT CO., WATERTOWN, MASS.
LAWRENCE GAS LIGHT COMPANY, LAWRENCE, MASS.
PEOPLES GAS-LIGHT COMPANY, BROOKLYN, N. Y.
CITIZENS GAS-LIGHT COMPANY, BROOKLYN, N. Y.
SOUTH BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CHARLESTOWN GAS-LIGHT CO., CHARLESTOWN, MASS.
LYNN GAS LIGHT COMPANY, LYNN, MASS.
FITCHBURG GAS-LIGHT COMPANY, FITCHBURG, MASS.
CITIZENS GAS-LIGHT COMPANY, NEWARK, N. J.
WILLIAMSBURGH GAS-LIGHT CO., WIRLIAMSBURGH, N. Y.

GAS AND WATER VALVES ½ INCH TO 36 INCHES DIAMETER.
STEAM VALVES ½ INCH TO 12 INCHES DIAMETER.
357-tf

CANNELTON COAL COMPANY

Of West Virginia,

Offer to Manufacturers of Gas the pure Cannel Coal from their Colliery at Cannelton, West Virginia. This coal after having been thoroughly tried by the most expert and reliable Engineers, has shown itself to be the most valuable **Enriching agent** produced in this country—a gross ton yielding **10,000** cubic feet of gas, of **64.54** candle power, to purify which, required only two bushels of lime. The yield of coke is **32 bushels** of good quality, quite light, burns freely, making a very hot fire. For further information address

J. TATNALL LEA, Treas.,
P. O. Box 1747. No. 325 Chestnut Street, Phil'a.

PEYTONA CANNEL COAL

From West Virginia.

Yields over **13,000** feet of Gas per ton. At ten thousand feet (standard yield) the illuminating power is over **43** candles. Purifies **4,510** feet to the bushel of lime.

S. E. LOW, Secretary,
354 Office, 58 Broadway.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

Entrance Examinations June 1 and 2, and Sept 23 and 24.
For new Catalogue and late Entrance Examination Papers apply to PROF. SAMUEL KNEELAND,
255-12t Secretary, Boston, Mass.

PROVIDENCE

Steam & Gas Pipe Co.,

PROVIDENCE, R. I.,

BUILDERS OF

Coal and Rosin Gas Works,

FOR TOWNS AND MANUFACTORIES.

Estimates furnished of the cost of Works, and cost to Manufacture Gas in any Locality.

Gasholders,
Iron Truss Retort House Roofs,
Water Tanks,
Purifier Covers,
Coke Barrows,
Cast Iron Socket Pipe.

Particular attention given to Enlarging and Re-building Gas Works.

For Lighting Manufactories, our Rosin Gas Works have been successfully used for *many years* past. They require but a small outlay, and afford a *safe* and *economical* light.

FOR SALE AT MANUFACTURERS PRICES:

EXHAUSTERS AND COMPENSATORS,
IRON AND CLAY RETORTS,
FIRE BRICK, CLAY AND TILE,
ROMAN CEMENT AND ROSIN,
STATION AND CONSUMERS' METERS.

REFER TO

Manufacturers' Gas Co., Fall River, Mass.; Youngstown Ohio, Gas Co.; New Rochelle, N. Y., Gas Co.; Homer and Cortland, N. Y. Gas Co.; Danbury, Conn., Gas Co.; North Bridgewater, Mass., Gas Co.; Cold Spring, N. Y., Gas Co., Rockville, Conn., Gas Co. Taunton, Mass., Gas Co.; Pawtucket, R. I., Gas Co.

FREDERICK GRINNELL, President, J. C. HARTSHORN, Treas,
S. MILLETT THOMPSON, Secretary.
Office and Manufactory, corner of Pine and Eddy Streets, Providence, Rhode Island.
Office in Syracuse, N. Y., No. 1 Granger Block.
H. A. BRANCH, Agent.

AMERICAN

GAS WORKS CONSTRUCTION AND *Supply Company.*

President—JAMES A. TAYLOR, Columbian Iron Works.

Engineer—A. F. HAVENS, late of Brooklyn Ca Light Co, Patentee of the following inventions:

HOISTING ENGINES,
COAL ELEVATORS,
WIRE-ROPE RAILROAD,
TRAYS FOR LIME OR IRON
RETORT CHARGING AND RAKING MACHINE,
RETORT SETTINGS,
SELF-SEALING LIDS,
AUTOMATIC DIP-PIPE SEAL
SECTIONAL PURIFIERS.

The above Patents are the result of many years experience, and are of great value, enabling any Company to increa e the capacity of its Retort and Purifying Apparatus 15 to per cent without change, and at slight cost.

Plans, Specifications, and Details furnished of all Apparatus, and Companies supplied with every thing required in Gas Manufacture, from the greatest to the least, at the lo w est market rates.

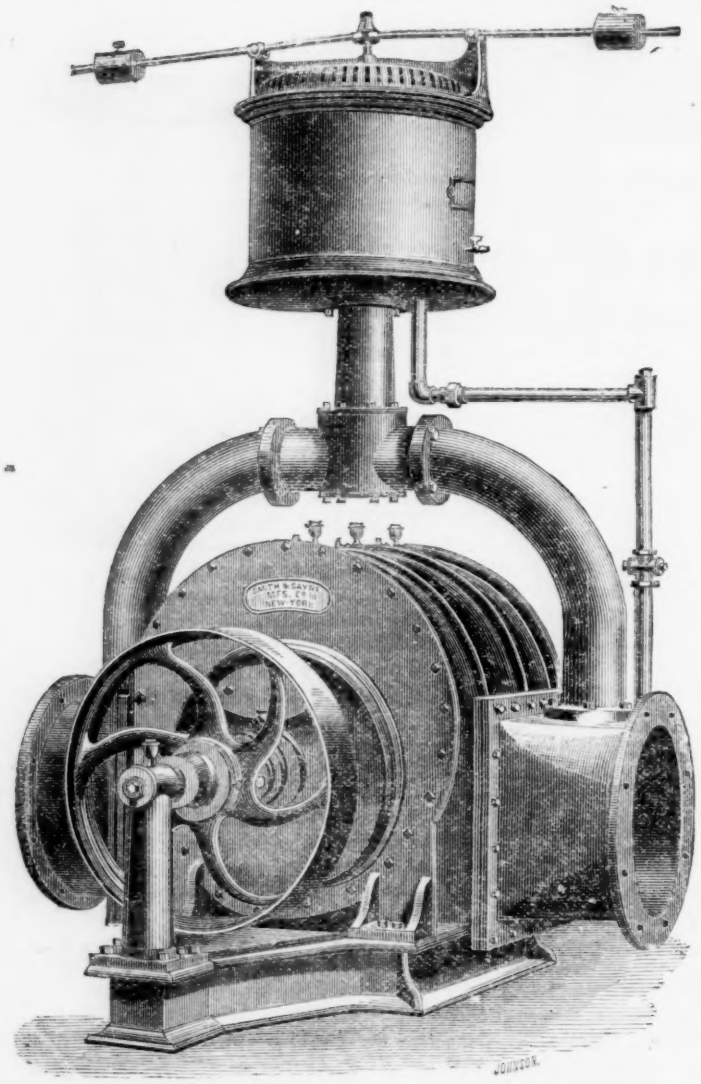
American Gas Works Construction and Supply Company,
No. 61 Broadway.

☞ Mr. HAVENS can be consulted on all matters appertaining to Gas and its manufacture, gratis.

SMITH & SAYRE MANUFACTURING COMPANY.

The Mackenzie Patent Gas Exhauster

And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan.

The Cupolas are manufactured in sizes to melt from 1 to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent fuel. Address

JAMES M. SAYRE, Treasurer. G. G. PORTER, President.

CHARLES W. ISBELL, Secretary. OFFICE, 95 LIBERTY STREET, New York.

AMERICAN

GAS SCREEN MAN'F'G COMPANY.

TO GAS-LIGHT COMPANIES.

Your attention is respectfully called to the GAS SCREEN now being manufactured by the American Gas Screen Manufacturing Company, under the patents granted to E. DUFFEE, and are pleased to submit the following points of their excellence and superiority over all other screens now in use.

The Screen is made with an oak frame, interlaced with split rattan, drawn through holes at regular intervals in the Frame and cross-pieces, the edges of the frame being grooved to prevent abrasion.

The advantages of the screen are:

1st. The large purifying surface, the construction of the Screen giving over three-fourths of the surface for the gas to penetrate the lime.

2d. On account of the free passage of the gas through the screen the pressure is reduced, thereby preventing the accumulating of carbon on the retorts.

3d. The saving of lime and labor, as the Screens are not liable to clog, and are easily cleaned.

4th. Their cheapness and simplicity of construction.

5th. Their DURABILITY—they can be used longer than any other now used.

Testimonials.

PROVIDENCE, RHODE ISLAND, March 21st, 1872

E. UFFFE, Esq., Agent, etc.

Dear Sir: The Trays manufactured by you for our West Station were put in use in September last, and have *given perfect satisfaction.*

The frames are well put together, and I see no reason why hey will not last for a long time. The *very large amount of* pen space in these Trays gives the gas an easy passage, and brings it into contact with the lime much better than when the space is so contracted, as is the case in most of the other Trays in use.

The pressure thrown upon the retorts by contracted passages is very great, and were gauges used more frequently than they now are in many gas-works, this facat of having *open Trays* would become more apparent to mangers of gas works. The digerence in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

The amount of gas purified, per bushel of lime used to this date, is six thousand five hundred and fifty six (6,556) cubic feet.

Respectfully yonrs,
JAMES H. ARMINGTON, Supt.

BOSTON GAS-LIGHT CO., Dec. 1871.

Dear Sir: In answer to your inquiry how we like your Patent Tray for dry gas purifiers, I take pleasure in saying we have used them exclusive of all others, for the last three years, and think them far ahead of any yet offered. The surface being nearly three times that of any other Tray, and their lightness and durability perfectly satisfactory.

Yours respedtfully,
A. M. GILES.

EDWARD DUFFEE, Esq.

EAST BOSTON, JUNE 15, 1871.

Gentlemen: We have used your Screens some five years. They give perfect satisfaction.

I consider them *by far the best Screen* for Dry Lime Purifiers I have seen. Yours truly, A. M. NORTON, Supt.

CHELSEA, May 1, 1871.

Mr. E. DUFFEE.

We are using your Purifying Trays, and find them to be the *best of any* that I have used, and will *purify more gas with less pressure* than any tray that I know. I can fully recommend them, after four years trial, to any Gas Superintendent with perfect safety, as the *cheapest and best Tray made.*

Yours truly, JOHN ANDREW, Sup't.

DORCHESTER, March 3, 1870.

Mr. E. DUFFEE.

Dear Sir: We have had your Gas Trays in constant use for almost one year and six months and find them superior to any others we have ever used, both in point of economy and efficiency. Truly yours, W. B. BROOKS,
Agent Dorchester Gas-Light Co.

JAMAICA PLAINS, MASS., June 21, 1871.

EDWARD DUFFEE, ESQ.

Dear Sir; The Trays ordered by this company three years ago, are getting somewhat worn. I wish to say here that I consider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like the sample shown in every way, and oblige Yours truly
JAMES F. ROGERS,
Sup't Jamaica Plains Gas-Light Co.

BROOKLINE, June 11, 1871.

E. DUFFEE, ESQ.

Dear Sir: You will please make a set of Gas Trays for this company as soon as convenient, at price named. In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country. Respectfully yours,
H. A. ALLYN,
Sup't Brookline Gas-Light Co.

BANGOR, August 2, 1870

EDWARD DUFFEE, ESQ.

Dear Sir: Yours of the 20th ult. is received. In regard to your Gas Trays, I take pleasure in saying that they have been in use over two years, and have given perfect satisfaction and they are in good order at the present time; should have no hesitation in recommending them, believing they are the most durable and easiest kept in order of any with which I am acquainted. Respectfully yours,
W. H. PERRY, Sup't.

OFFICE OF THE SPRINGFIELD GAS-LIGHT CO.
SPRINGFIELD, MASS., Oct. 10, 1871.

Mr. WARD,
President Hartford Gas-Light Co.

Dear Sir: I have been using Gas Screens made by the American Gas Screen Company, for nearly a year, and find them superior in every way to the wooden Screens made and formerly used by the Springfield Gas-Light Co. I can purify more gas with the same quantity of lime, there being more surface to the Screens; and I consider them more durable. and recommend them to your consideration.

Yours with great respect,
GEORGE DWIGHT.

ROXBURY, June 14, 1872.

EDW. DUFFEE, ESQ.

Dear Sir: In answer to your inquiry regarding your Patent Gas Screens, I am happy to be able to say, that after nearly three years constant use we are perfectly satisfied with them being able to purify over fifty pet cent. more gas with them than with any other Screen we have used.

Yours respectfully,
THOMAS J. PISHOU

OFFICE DETROIT GAS-LIGHT CO.,
DETROIT, MICH., April 22, 1872.

AMERICAN GAS SCREEN MANUFACTURING CO., HAVERHILL.

Gentlemen: The Screens bought of you work far better than any we have ever used. As a proof, we have with the same quantity of lime purified *twenty per cent.* more gas with your Screens than with any others, and the work well done. The workmen are also better pleased with them—they being light and handy to work. They also relieve the pressure very much upon the retorts, and I cheerfully give yau my experience.

Yours truly,
P. E. DEMILL, Secretary.

We give a list of some Gas-Light Companies using them.

Providence, R. I. Gas-Light Co., Boston, Mass. Gas-Light Co.: East Boston, Mass., Gas-Light Co.; South Boston, Mass. Gas-Light Co.; Springfield, Mass., Gas-Light Co.; New Bedford, Mass., Gas-Light Co.; Manchester, N. H., Gas-Light Co.; Reading, Penn., Gas-Light Co.; Biddeford, Me., Gas-Light Co.; Hartford, Conn., Gas-Light Co.: New Haven, Conn., Gas-Light Co.; New Orleans, La., Gas-Light Co.; Savannah, Ga., Gas-Light Co.; Charleston, S. C., Gas- Light Co.; Trenton, N. J., Gas-Light Co.; Charlestown, Mass., Gas-Light Co.; Dorchester, Mass., Gas-Light Co.; Chelsea, Mass., Gas-Light Co.; Baltimore, Md., Gas-Light Co.; Manhattan, N. Y., Gas-Light Co.; Cincinnati, Ohio.; Gas-Light Co.: San Francisco, Cal., Gas-Light Co.: Albany, N. Y., Gas-Light Co.; Sacramento, Cal.; St. Joseph, Mo., Gas-Light Co.; Leavenworth, Kansas, Gas-Light Co.; Macon, Ga., Gas-Light Co.; Roxbury, Mass., Gas-Light Co.; Lansinghburg, N. Y., Gas-Light Co.; Bridgeport, Conn., Gas-Light Co.; Stamford, Conn., Gas-Light Co.; Poughkeepsie, N. Y., Gas-Light Co; Scranton, Penn., Gas-Light Co.; Lewiston, Me., Gas-Light Co., and one hundred others.

Address **R. A. POTTER, Treas.,**
Amer. Gas Screen Man'f'g Co., Haverhill, Mass

EDWARD DUFFEE, Agent.

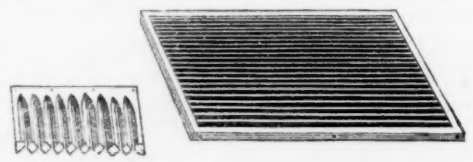
J. L. CHEESMAN.

MANUFACTURER OF

Patent Conically and Diamond Slotted

SOLID WOOD TRAYS.

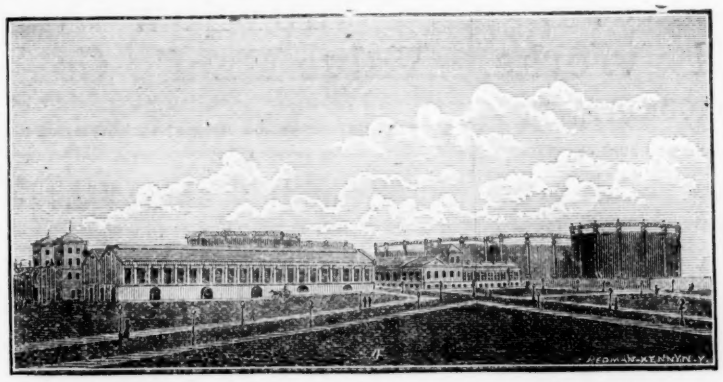
PATENTED OCTOBER 21, 1862 AND JUNE 10, 1873.



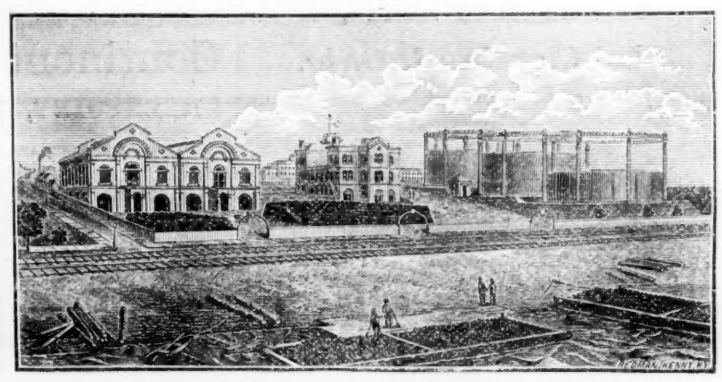
To Gas Companies.

The above Trays will last longer. and are cheaper than any Tray now used. They are now made without any outside strips, which gives more purifying surface, being perfectly smooth. The lime will not adhere to them as in other Trays. They are now used in over three hundred Gas Companies in the United States, and other places.

JOHN L. CHEESMAN,
151 and 153 Avenue C, New York.



CINCINNATI GAS WORKS. ERECTED 1871-72-73.—WM. FARMER, ENG.



LACLEDE GAS WORKS, ERECTED 1872.—WM. FARMER, ENG

WILLIAM FARMER,

ARCHITECT AND GENERAL GAS ENGINEER,

111 BROADWAY, TRINITY BUILDING, Room 95, New York.

WILLIAM FARMER may be consulted upon all matters connected with the construction of GAS WORKS, or any other description of buildings. Will furnish General and Detail Drawings, Specifications and Estimates for Gas Works of any capacity.

PATENTEE OF THE FOLLOWING INVENTIONS:

Exhausters for Gas and Foul Lime Ventilation,
Dumping Barrows for Coal, Coke and Lime,
Hydraulic Mains for Retort Benches,
Blowers for Forges, Foundries, &c.
Pumps for Water, &c., &c.

REFERENCES:

Professor SILLIMAN, New Haven, Conn.
GEN. CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
A. W. BENSON, President Brooklyn Gas-Light Company, Brooklyn, N. Y.
W. W. SCARBOROUGH, President Cincinnati Gas-Light Company, Cincinnati, Ohio.
S. L. HUSTED, President Laclede Gas-Light Company, St. Louis, Mo.
Prof. HENRY WURTZ, Editor AMERICAN GAS-LIGHT JOURNAL, N. Y.
GEN. A. HICKENLOOPER, Vice-President Cincinnati Gas-Light Co., Cincinnati, Ohio.
FREDERICK CROMWELL, Vice-President Laclede Gas-Light Company, St. Louis, Mo.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal. [342

GAS PURIFICATION.

St. John and Cartwright's
NEW IRON COMPOSITION

Has purified, per bushel, on a single test, 10,000 feet of Westmoreland Gas. With revivification lasts indefinitely. Surpasses in POWER and ECONOMY all known materials. Saves largely in FIRST COST, SPACE, LABOR, SUPERINTENDENCE, and all current expenses. Will purify *easily* sulphurous gas, wholly *unmanageable by lime*. Takes out *all the ammonia*. Now operating in the following Gas Works: Harlem, New York (21st street); Port Morris; Hunter's Point; East New York Worcester, Lynn and Cambridge, Mass.; Lewiston, Maine; St, Albans, Vt.; Pawtucket, R. I.; Meriden, Ct.; and being introduced in many other places.

Cost 70 cents per bushel. One bushel for each square foot of Purifier sufficient. Rights to use for life of Patents, for daily makes of gas in thousands; under 25,000 $200; under 50,000, $400; under 100,000, $500; $250 additional for each additional 50,000 per day.

For further information and instructions, apply to

ST. JOHN & CARTWRIGHT,
21st Street and Avenue A, New York Gas Works.

☞ Immediate arrangements are urged, as the demand for e prepared composition is increasing *so rapidly* that delays supply may occur.

B. S, BENSON.

MANUFACTURER OF

Cast Iron Pipes and Fittings,

AND

Gas and Water Mains.

All sizes from 3 to 30 inch cast vertically in 12½ feet lengths

Office & Factory 52 East Monument St.,

BALTIMORE, MD.

OHIO GAS CANNEL,
From the Sterling Colliery.

We are now prepared to place in the market, through our agents as below, a regular and unlimited supply of this valuable Cannel, for gas purposes. The analysis made in 1871 by Prof. WURTZ, Editor of this Journal, at the Laboratories of the NEW YORK GAS-LIGHT COMPANY, gave 47½ per cent of Volatile Matter and 45 bushels to the ton of a fair quality of coke. The yield of gas was at the rate of 9,500 feet per ton of about 27 candle power. It is not highly sulphurous, can be purified by Lime, and the ash from the coke does not clinker. The above test has been fully substantiated as correct, and can confidently recommend trial of the coal.

TUTTLE & GIRTY Proprietors,
Cleveland, Ohio.

GENERAL AGENTS.

Geo. Merryweather, & Co., 111 Broadway.

GEO. STACEY. HENRY RANSHAW. WM. STACEY.

GEO. STACEY & CO.,

MANUFACTURERS OF SINGLE AND TELESCOPIC

GAS-HOLDERS,

AND ALL KINDS OF

Cast and Wrought Iron Work

Used in the Erection of Gas and Coal Oil Works.

Foundry on MILL STREET; Nos. 33, 35, 37 and 39.

Office and Wrought Iron Works on RAMSAY STREET Cincinnati, Ohio.

REFERENCE.

Cincinnati Gas-Light Co.	Baton Rouge, La., Gas Co.
Indianopolis Gas Co.	Saginaw, Mich., Gas Co.
Dayton, O., Gaslight Co.	Oshkosh, Wis., Gas Co.
Covington, Ky., Gas Co.	Peoria, Ill., Gas Co.
Springfield, O., Gas Co.	Quincy, Ill., Gas Co.
Terre Haute, Ind., Gas Co.	Champaign, Ills., Gas Co.
Madison, Ind., Gas Co.	Carlinville, Ill., Gas Co.
Kansas City, Mo., Gas Co.	Bowling Green, Ky., Gas Co
Topeka, Kansas, Gas Co.	Hamilton, Ohio, Gas Co.
Burlington, Iowa, Gas Co.	Vicksburg, Miss., Gas Co.
Nashville, Tenn., Gas Co.	Denver City, Cal., Gas Co.

R. T. Coverdale, Eng'r Cincinnati, and others.

JESSE W STARR & SONS,

Camden Iron Works

Camden, New Jersey,

MANUFACTURERS OF

ALL KINDS OF CASTINGS AND APPARATUS FOR GAS WORKS,

Wrought Iron Roof Frames,

For Retort and other houses Retorts and all castings required for setting them in the latest and most improved model. WASHERS, CONDENSERS, SCRUBBERS and EXHAUSTERS for relieving the Retorts from pressure. PURIFIERS, varying from 2,000 to 2,000,000 cubic feet daily purifying capacity.

Wrought Iron Lime Sieves,

for Purifiers. Station Meters of all sizes.

GAS HOLDERS,

TELESCOPIC AND SINGLE,

With cast iron guide and suspension frames. GAS GOVERNORS or REGULATORS, STREET MAINS, from 1½ to 48 INCHES DIAMETER, for WATER or GAS. Street Main connections, such as BRANCHES, BENDS, DRIPS, SLEEVES, etc.

STOP VALVES, from 3 to 30 inches, for both Water and Gas.

Wrought Iron Work.

All the Smith and Sheet Iron work required in and about Gas Works. 226-tf

JESSE W. STARR. BENJ. A. STARR. BENJ. F. ARCHER.

TO GAS COMPANIES.

WANTED—BY A YOUNG MAN, A SITUATION AS MANAGER, or would act as Foreman. Has had an almost life-long experience in England, in the Manufacture and Distribution of Coal Gas. Recommendations as to ability can be shown. Understands the manufacture of Sulphate of Ammonia. Address JOHN HANDEL, Peabody, Mass., P. O. Box 334. 355-4t

FREEMAN BUTTS,

Of Cleveland, Ohio.

MINER AND SHIPPER OF THE CELEBRATED AND ONLY GENUINE

Sterling Coal,

also dealer in YOUGHIOGHENY, PITTSBURGH, AND AMERICAN CANNEL. Would refer to the following Gas-Light Companies, who have used the HAND PICKED SELECTED COAL:

New York City, Manhattan and New York Companies, Brooklyn, Albany, Troy, West Troy, Rochester, Buffalo, Oswego, Ogdensburgh, Lansingburg, Newburg, Rome, Palmyra, Geneva, Yonkers, Rondout, Kingston, Albion, Brockport, Seneca Falls, Elmira and Lyons, in State or New York; Cleveland, Toledo, Sandusky, Norwalk, Oberlin, Salem and Fremont in Ohio; Detroit, Ann Arbor, Grand Rapids, Kalamazoo, Jackson and Adrian, in Michigan; Toronto, Hamilton, and Coburg, in Canada; Chicago, Ill., and two Companies in Milwaukee, Wisconsin.

Letters in reference to Coal should be addressed to the General Office of FREEMAN BUTTS, Cleveland, Ohio. 354

MONONGAHELA

GAS COAL COMP'Y

Of West Virginia.

OFFICE, 56 EXCHANGE PLACE.

(P. O. Box 432.)

BALTIMORE.

Thomas Gemmell, *President.*
A. Robinson, *Vice-President and Treasurer.*
Benjamin Bissell, *Secretary.*

Mines at Wilsonburg, Harrison Co., W. Va.
Shipping Port, Baltimore.

This coal yields of Gas 11,200 cubic feet per ton of 2,240 lbs. and has an Illuminating Power of 16.30 st. candles. 350-3m

TYRCONNELL GAS COAL.,

MINED IN TAYLOR COUNTY, WEST VA.

Company's Office, 52 S. Gay St., Baltimore.

CHARLES MACKALL, Secretary.

CHARLES W. HAYS, Agent, Room 7, 111 B'way, N. Y.

SHIPPING POINT—Baltimore, Md.

This coal yields 10,000 cubic feet of Gas, with an illuminating power of over 16 candles. Forty bushels of very superior Coke, with little Ash, and scarcely any clinker. 304-1y

EVENS & HOWARD,

Manufacturers of a superior quality of

Fire-Brick, Clay Gas Retorts,

Gas Tile, Drain Pipe, Fine Ground Fire Clay, &c.

916 Market Street, St. Louis, Mo.

313-3m

NATIONAL FOUNDRY

AND PIPE WORKS.

OFFICE AND WORKS—CARROLL, PIKE, SMALLMAN AND WILKINS STREETS,

PITTSBURGH, PA

WM. SMITH,

Manufacturer of all kinds of GAS and WATER PIPE BRANCHES, CONNECTIONS, T's, ELBOWS, and all CASTINGS USED AT GAS AND WATER WORKS,

We offer special inducements to parties wishing to purchase. My Pipe is Smooth, regular in weights, and cast vertically.

N. B.—Pipe from 3-inch and upwards, cast in 12-ft. lengths.

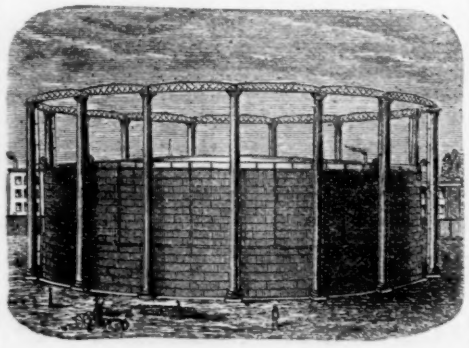
☞SEND FOR CIRCULAR AND PRICE LIST.☜ 21

T. F. ROWLAND,

Continental Works,

GREENPOINT, BROOKLYN, N. Y.

ENGINEER, AND MANUFACTURERS OF



GAS-HOLDERS

OF ANY MAGNITUDE,

Condensers, Scrubbers, Purifiers, Retorts, Hydraulic Mains, and all other articles connected with the Manufacture and Distribution of Gas, furnished with despatch. Plans and Specifications prepared, and Proposals given for the necessary Plans for Lighting Cities, Towns, Mansions, and Manufactories.

B. S. BENSON & SON,

No. 112 BROADWAY, N. Y., ROOM 1.

MANUFACTURERS OF

CAST IRON GAS & WATER PIPE,

And Fittings for Gas & Water Mains, &c.

All sizes from 3 to 30 inches, cast vertically, in lengths of 12½ feet.

NEW YORK AND CLEVELAND

GAS COAL COM'Y

Of Pittsburgh, Pa.

MINERS AND SHIPPERS OF

YOUGHIOGHENY GAS COAL.

This Company is prepared to furnish any amount of their justly celebrated, and acknowledged superior GAS COAL, to any point reached by railroad or navigation, on most favorable terms.

General Office—384 Penn Avenue,
PITTSBURGH, PA.

Branch Office—C. & P. RR. Coal Pier,
CLEVELAND, OHIO.

WILLIAM A. McINTOSH, President.
A. CARNEGIE, Vice-President.
W. P. DE ARMIT, Treasurer.
THOMAS AXWORTHY. Agent at Cleveland, Ohio.

351-1y

THE NEWBURGH

Orrel Coal Company,

Mines at Newburg, Preston County, W. Va.

Company's Office, No. 52 S. Gay Street, Baltimore, Md.

C. OLIVER O'DONNELL, Pres't. CHAS. MACKALL, Sec'y.

CHAS. W. HAYS, Agent in New York, Room 7, Trinity Building, 111 Broadway.

SINCLAIR & AGNEW, Agents, Alexandria, Va.

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizen's Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and the Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. 224-1y.

LUDLOW

Valve Manf'g Co.,

OFFICE AND WORKS

938 to 954 River Street and 67 to 83 Vail Ave.,

TROY, NEW YORK.

BRASS AND IRON SLIDE VALVES.

(Double and Single Gate ¼ inch to 36 inch—outside and inside screws, Indicator etc.) for Gas, Water and Steam—.

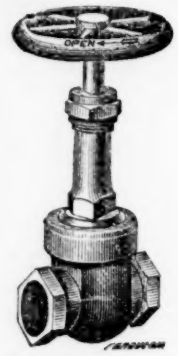
HYDRAULIC MAIN DIP REGULATORS.

ALSO

FIRE HYDRANTS.

REFERENCES FURNISHED.

SEND FOR CIRCULARS.



MURRAY & BAKER,

Practical Builders,

And Contractors for the Erection of Gas Works,

MANUFACTURERS OF ALL THE LATEST AND MOST IMPROVED APPARATUS AND TOOLS FOR THE MANUFACTURE & DISTRIBUTION OF COAL GAS.

☞ WORKS AT THE RAILWAY DEPOTS,

FORT WAYNE, INDIANA.

We manufacture Bench Castings, Washers, "The Immersed Multitubular," and Atmospheric Condensers, Wet and Dry-Lime Purifiers, Dry Center Seals, Telescopic and Single Gas Holders, Wrought Iron Trussed Roof for Iron or Slate, Wood and Iron Trays for Purifiers, Coke and Coal Carts, Wrought Iron Screening Shovels and Castings, and Wrought Work of every description for Gas-Works.

As Mr. Murray is a Practical Draughtsman, we will furnish plans and specifications to parties or associations, or will wait personally upon parties contemplating the construction of new works, or the alteration or extension of old ones

The most satisfactory references can be given, if required of the experience and commercial fairness which characterizes our dealings.

We would respectfully invite Western mento call and see our patterns and works here, MURRAY & BAKER,
198-1y Fort Wayne, Indiana.

OFFICE OF THE

NATIONAL COAL GAS COMPANY,

No. 4 Warren Street, New York.

H. P. ALLEN, President.
I. B. BRICE, Vice-President.
A. H. ALLEN, Secretary.
WM. J. VALENTINE, Treasurer.
GEORGE W. HARRIS. Engineer.

This Company is the owner of the GWYNNE-HARRIS, o AMERICAN HYDROCARBON process, for making Gas for Lighttng or Heating purposes, by the perfect decomposition of superheated steam, under what is known as the

GWYNNE AND HARRIS PATENTS.

This process has been fully tested nearly 50,000,000 cubic feet of Gas having been made under it, and fully demonstrating the fact that it is the greatest improvement ever made in the manufacture of Gas, either for Lighting or Heating purposes. With half a ton of Anthracite Coal 150,000 cubic feet of Gas per day is made from three benches, and the labor is so small that one man can attend three or four benches.

The process can be put into either Coal or Oil Gas Works (or where both Coal and Oil are used) at small cost, without any interruption to the working of other benches. The Citizens Gas-Light Company of Brooklyn, after using it for more than seven months, have found it not only far better, but actually *cheaper* than atmospheric air in making Gas, with the use of "petroleum and its products."

Further information, and terms of sale of rights will be given, upon application to the Company. 348-1

BIRD, PERKINS, & JOB.

REPRESENTING THE FOLLOWING WELL KNOWN PRODUCERS OF

GAS COALS and CANNEL.

Westmoreland Coal Co.
Cannelton Coal Co. (Cannel),
Waverly Coal Co. (Youghiogheny),
Red Bank Mining Co. (Orrel and Cannel),
Caledonia, and Glace Bay Mining Co.
Block House Coal and Railway Co.
Vale Coal and Iron Co.--Pictou.
Cape Breton Coal Co.
Spring Hill Mining Co.

27 South Street, New York. **103 State Street, Boston.**

KEYSTONE IRON WORKS,

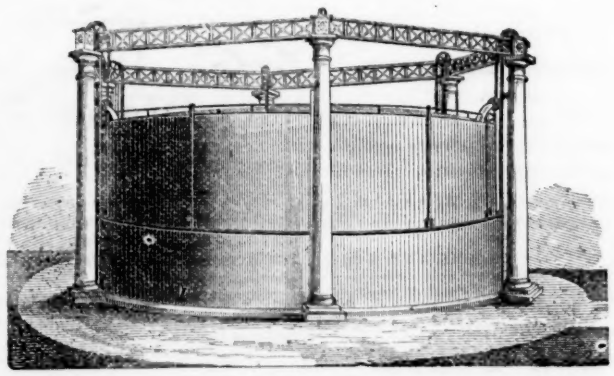
2132 FILBERT STREET, Philadelphia,

G. W. KRAFT, PROPRIETOR,

MANUFACTURES

GASOMETERS.

COAL CARS, PURIFYING BOXES, COKE BARROWS.



WATER TANKS. RETORT HOUSE ROOFS.

Wrought Iron Work for Bridges, Buildings, Steam Boilers, Tanks, Stills, Etc.

☞ Particular attention paid to Alterations and Repairs.

RED BANK MINING COMPANY

ARE PREPARED TO SUPPLY THEIR

Gas Coal and Cannel

from their Colliery near New Bethlehem, Clarion County, Pa. These mines are situated directly on the line of the Bennett Branch of the Alleghany Valley R. R. (just completed) and only 20 miles from its junction with the Main Line at Red Bank. This position enables them to supply Gas Companies **in any part of New York State,** and **Northern Pennsylvania,** by **Rail direct from** the **Colliery at all seasons of the year**—or to points on the **Canals or Lakes,** during navigation *via* **Buffalo or Erie.**

The **Gas Coal** (Red Bank Orrel) is specially adapted to **Gas Manufacture,** its yield being as large as that of any Caking Coal in the market, of easy purification and good illuminating power.

The Cannel is superior to any of the Ohio Cannels, obtainable and can be delivered in any required quantity, from one car and upwards. For particulars as to price, etc., apply to

BIRD, PERKINS & JOB,

P. O. Box 5623. GENERAL AGENTS, 27 South St., N. Y.

JAMES MARSHALL & CO.

Franklin Foundry and Pipe Works,

MANUFACTURERS OF

GAS, WATER, AND OIL PIPES,

Works, 18th, 19th, 20th and Railroad Street.
Office, No. 23 Nineteenth Street.

Pittsburgh, Pa.

N. B.—Pipe from 3-inch and upwards cast in 12 ft. lengths.

☞ Send for Circular and Price List.

MITCHELL, VANCE & CO.,

Manufacturers of

CHANDELIERS!

And Every Description of

GAS FIXTURES,

Also Manufacturers of

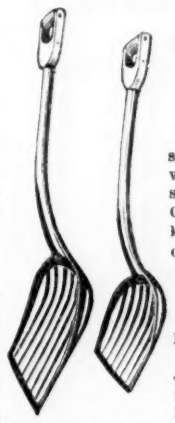
Fine Gilt Bronze and Marble Clocks, warranted best Timekeepers, Mantle Ornaments, &c.

Salesroom, 597 BROADWAY,

Rear Entrance 140 Mercer Street,) NEW YORK.

Special designs furnished for Gas Fixtures for Churches Public Halls, Lodges, &c.

BUTLER'S PATENT
Coke and Coal
SCREENING SHOVELS.



MADE FROM BEST MALLEABLE IRON AND STEEL.

FURNISHED WITH LONG OR D HANDLES

Perfect in their operation, a very strong, and from their great durability vastly more economical than any substitute. Refer to all the principal gas Companies in the country, who acknowledge them as the "ne plus ultra of Coke Screening Shovels.

Orders addressed only to

O. R. BUTLER,
Sole Agent.
No. 96 Maiden Lane, N. Y.

☞ I still retain the original SABBATON LETTERS PATENT, and have granted no rights or privileges to any other parties.

THE CAMBRIDGE GAS-LIGHT CO.

Having erected new Works, offer for sale at a great reduction from cost, the following articles of apparatus:

Fourteen lengths of Hydraulic main, 16 inches diameter, 7 feet 7 inches long, 5 holes for dip pipes.
Seventy Dip Pipes, 5 inches diameter.
Seventy X Pipes, 5 inches diameter.
Seventy Stand Pipes, 6 to 5 inches diameter.
Seventy Mouth Pieces for 6 inch Stand Pipes.
One set Condensers, 14 inch Pipes with 6 in. internal Pipe.
One Exhauster with Compensator, Governor, Valves, Pass, by and Connecting Pipes, 8 inches diameter, made by Smith & Sayre, in use but a short time; capacity 12,000 feet per hour; has delivered 16,000 with ease; amply sufficient to deliver 350,000 feet a day.
Four Purifiers, 10 by 16 feet, 5 sets trays, 8 inch connections, all in perfect order except the covers.
Wet Centre Seal for the same.
Two sets Hoisting Gear for covers.
Also a Station Meter with 10 inch connections; made by Tufts; has been run but a short time, in perfect order Capacity 15,000 feet per hour.

Any part or the whole of the above will be sold very cheap, and delivered in six'y days.

Apply by letter or personally to ESTES HOWE, Treasurer, or WILLIAM GIBSON, Superintendent, at the office of the Company, Harvard Square, Cambridge, Mass. 343-tf

Portland Cement,
Roman Cement,
Keene's White Cement,

NUMBERS 1 AND 2.

From best London Manufacturers.

FOR SALE BY

S. L. MERCHANT & CO.,

76 South Street, New York,
Corner Maiden Lane. 344-1y

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.
Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y
BANGS & HORTON, No. 31 Duane street, Boston.
Mines in Harrison County, West Virginia.
Wharves Locust Point, } Baltimore.
Company's Office, 29 South street, }

Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine.

*** Reference to them is requested 204-1y

FOR SALE.—TWO IRON TRUSS RETORT HOUSE Roofs, with Ventilators, complete; as good as new. One of them will cover a building 28 feet by about 75 feet; the other 30 feet by 45 feet or 50 feet, all in the clear. For further particulars address F. A. SABBATON,
341-tf Sup't Troy Gas-Light Co., N. Y.

THE NATIONAL OIL JOURNAL

CONTAINS

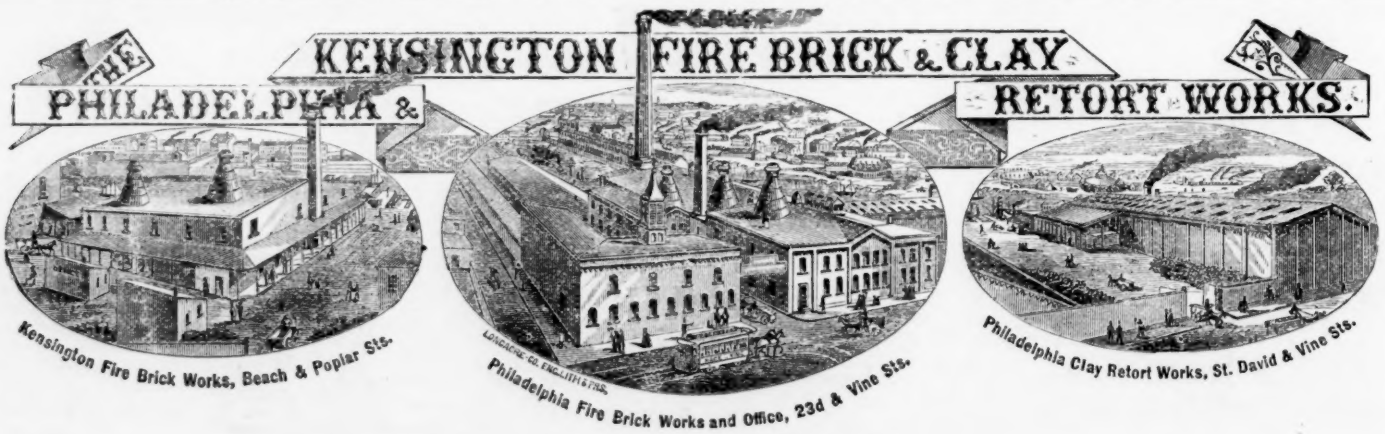
INFORMATION CONCERNING THE PRODUCTION, MANUFACTURE AND USE OF ALL KINDS OF OIL.

EVERY ONE INTERESTED IN OIL SHOULD TAKE IT.

Subscription—One Dollar.

Sample Copies Ten Cents.

NATIONAL OIL JOURNAL COMPANY,
PITTSBURGH, PA.

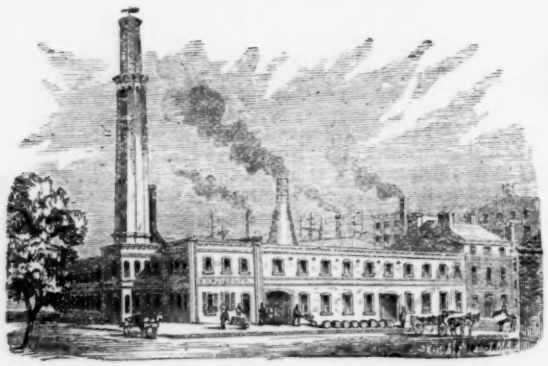

THE
PHILADELPHIA &
KENSINGTON FIRE BRICK & CLAY
RETORT WORKS.
Kensington Fire Brick Works, Beach & Poplar Sts.
Philadelphia Fire Brick Works and Office, 23d & Vine Sts.
Philadelphia Clay Retort Works, St. David & Vine Sts.

PHILIP NEUKUMET,

(SUCCESSOR TO JOHN NEUKUMET),

Manufacturer of Fire Bricks, Tiles, Gas and Sugar House Retorts.

☞ Plans of Settings for Benches of Threes, Fives, and Sixes furnished, free of charge, upon application.



NEW YORK
FIRE BRICK AND CLAY
Retort Works.

☞ *Established in* 1845. ☜
(Branch works at Kreischerville, Staten Island.)

B. KREISCHER & SON,

OFFICE,
58 Goerck Street, cor. Delancy, N. Y

GAS RETORTS, TILES & FIRE BRICK
Of all shapes and sizes.

FIRE MORTAR, CLAY AND SAND.

Articles of every description made to order at the shortest notice.

B. KREISCHER & SON

JOHN McNEAL & SONS,

MANUFACTURERS OF

Cast Iron Gas and Water Pipe.

Works—Burlington, N. J.

Having withdrawn from the firm of R. D. Wood & Co., the practical management of which we have had since the organization of that firm until June 1871, we have now completed our Works for the manufacture of CAST IRON PIPE and Castings generally.

Having immediate rail and water communication with New York and Philadelphia, as well as the coal and iron regions we have every advantage of situation.

Our experience in the manufacture of Pipe for a great many years, has enabled us in rebuilding to practically apply Machinery and Fixtures of the very best character, to insure *good work.*

We are now prepared to contract for this class of Castings under the most favorable terms.

Office and Works Burlington, N. J.

WEST END SUPPLY CO.

MANUFACTURERS OF AND DEALERS IN

EVERY DESCRIPTION OF

Gas Works Supplies,

25, 27 and 29 North 20th Street, Phil'a.

353-1y CHARLES H. BROWN, Manager.

JERSEY CITY

GAS METER WORKS.

R. M. POTTER & CO.,

MANUFACTURERS OF

CONSUMERS GAS METERS, WET AND DRY,

Station Meters, Center Seals, Governors, Pressure Registers,

AND ALL KINDS OF PRESSURE GAUGES.

Experimental Meters and Standard Test Gasholders,

☞ And all apparatus in use at the Gas Works ☜

14 Morris St., Jersey City, N. J. (1y

RETORT SETTING & WORKING.

AN ILLUSTRATED PAMPHLET,

By E. S. CATHELS.

To be had of Messrs. A. M. CALLENDER & CO., 42 Pine street, N. Y. Price 75 cents.

Working Drawings and Specifications of Cathels's Improved Retort Settings.

To be heated by COKE, TAR, or BREEZE.

For terms apply to E. S. CATHELS, Gas Works, Montreal **Canada.**

S. DECATUR SMITH,

SUCCESSOR TO

SMITH & ELLIS.

CAST IRON GAS & WATER PIPE,

FOUNDRY COR. OF YORK AND MOYER STS,

Philadelphia.

Several Thousand 3, 4 and 6 inch Cast Iron GAS and WATER PIPES on hand, for immediate delivery.

☞ **Fittings for Gas and Water Mains.**

319-1y

MANHATTAN

FIRE BRICK & ENAMELLED CLAY

Retort Works,

MAURER & WEBER,

(Of the late firm of B. Kreischer & Co.,)

PROPRIETORS.

Office and Works, 15th Street, Avenue C.

Manufactures of

FIRE BRICK AND TILES,

Of all shapes and sizes.

FIRE MORTAR, CLAY AND SAND.

☞ Articles of every description made to order at short notice. (135

HY. MAURER. ADAM WEBER.

LACLEDE FIRE BRICK

AND

Clay Retort Works,

Cheltenham, St. Louis Co., Mo.

Laclede Fire Brick Manufacturing Co.

Office, 901 Pine Street. Warehouse, 1007 N. Levee, St. Louis.

MIDDLETOWN

Tube and Iron Co.

MANUFACTURERS OF

Wrought Iron Pipe

For Gas, Steam, Water, Etc.

WORKS—MIDDLETOWN, PENN'A.

OFFICE—25, 27 AND 29 NORTH 20TH STREET, PHIL'A.

THOMAS R. BROWN, President.
JOS. H. LANDIS, Sec'y and Tr°
335-1y WILLIAM H. BRINES, Sup't.

B. E. CHOLLAR,

Gas Engineer,

914 OLIVE STREET, ST. LOUIS, MO.

355-12t

FOR SALE.

A Station Meter,

in good order—2 feet 6 inches by 2 feet 4 inches—four inch connections. Address

DAVID BRAYTON, Superintendent.
North Bridgewater, Mvss.,
355-4t Post Office Box 1294.

GAYLORD IRON AND PIPE COMPANY.

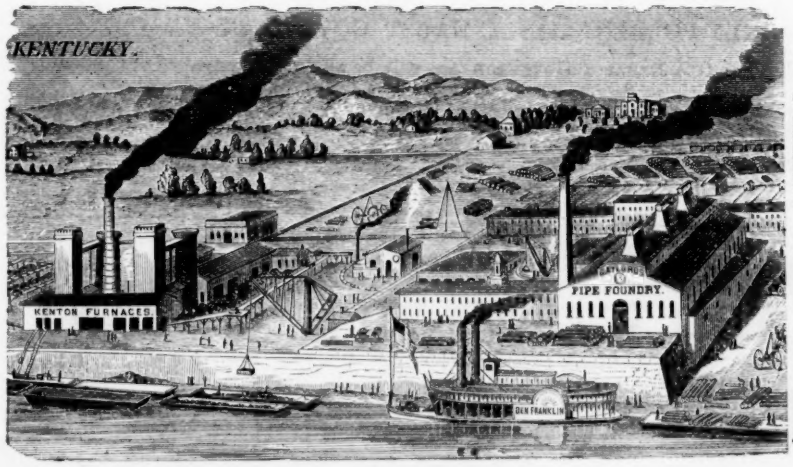
Office, 90 and 92 Broadway, Cincinnati, Ohio.

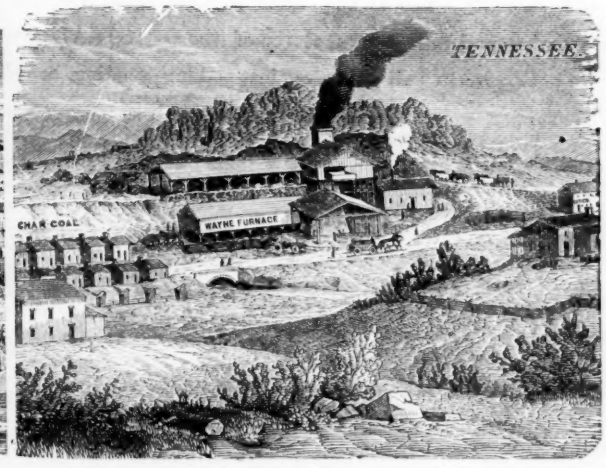
Works, Newport, Ky.

T. G. GAYLORD, President. S. B. BROWN, Superintendent. C. B. FOOTE, Secretary and Treasurer.

H. G. H. TARR, Department of Sales and Contracts.

MANUFACTURERS OF





CAST IRON GAS AND WATER PIPE.

And all forms of Special Castings for Gas and Water Works.

PIPE—2, 3, 4, 5, 6, 8, 10, 12, 14, 15, 16 to 60 inches 3 inches and above Cast in Dry Sand in 12 feet Lengths.

FLANGE, STEAM and HEATING PIPE.

Our KENTON FURNACE gives us a fine quality of Stone Coal Iron; this with our Tennessee Charcoal Iron, which we retain for our Foundry use, enables us, by controlling our Iron, to turn out Castings of a uniform and superior quality, and at a cost advantageous to our Customers.

We are turning out now for the Spring trade a very large tonnage of **STREET MAINS**, and are prepared to promptly fill all orders at low price.

JOHN P. KENNEDY,

SUCCESSOR TO

Hoy, Kennedy & Co.,

GAS ENGINEER AND CONTRACTOR

For the Erection, Alteration and Extension of Gas Works.

PLANS, SPECIFICATIONS AND ESTIMATES.

Office 98 Liberty Street. P. O. Box 2,348

AGENT FOR THE

ATLANTIC DOCK

Iron & Machine Works,

FERRIS, WOLCOTT AND DYKEMAN STREETS,

South Brooklyn.

MANUFACTURERS of every kind of Gas Machinery, Retorts Bench Castings, Wrought Iron Work, Multitubular and Air Condensers, Washers, Scrubbers, Purifiers, Exhausters with every equipment complete for large or small Works, Gasholders, Telescopic or Single; Iron Roof Frames with Cornice Gutters, covered with Corrugated Iron or Slate; Iron Doors and Iron Pivot Blind Windows; Coke Barrows, Fire Tools, Retort Lids, Cotter Bars and Screws, Stop Valves, Tar Valves for Regulating Dip in Hydraulic Mains, Pressure Governors for Street Mains, and Compensators for Exhausters that are unrivalled for unvarying accuracy Steam Engines, Boilers, Etc., Etc.

Post Office Box 2,348. Office 98 Liberty st

WORKS UPON GAS.

BOWDITCH.—THE ANALYSIS, TECHNICAL VALUATION, Purification, and Use of Coal Gas, with illustrations 8vo. cloth. Price, $4.50.

GAS-LIGHT MANUAL.—Being a Treatise on the Management of Coal Gas, as applied to Domestic Purposes, etc. By John Campbell. Paper, 75 cents.

A GUIDE TO GAS-LIGHTING—By Alexandor H. Wood, A. I. C. E.; second edition. Revised and enlarged. 8vo. paper, 50 cents.

LAW OF GAS AND WATER SUPPLY—Comprising the Rights and Duties as well of Local Authorities as of Private Companies in regard therete. By W. H. Michael and J. Shiress Will. 1 vol. crown 8vo. cloth. $9.00.

CLEGG—Treatise on the Manufacture of Coal Gas, 5th edition, enlarged, 4to, cloth. Price, $10.50.

COLBURN—The Gas Works of London, 12mo, boards. Price, 60 cents.

GAS CONSUMERS' GU —A Hand Book of Instruction on the proper management and economical use of gas, etc., etc. 12mo., cloth. Price, $1.00.

HUGHES—Gas Works and Manufacturing Coal Gas, 12mo Price, $1.20.

D'HURCOURT—De l'Eclairage du Gas. Par E. R. Hucourt, 3d edition. Paris, 1863; 8vo. and plates, $6.00.

RICHARD—Gas Consumer's Guide, 12mo. Price, 50 cents

SWEET—Special Report on Coal, showing its Distribution, Classification, and Cost, delivered over different routes to various points in the State of New York, and the principal cities on the Atlantic Coast. By S. H. Sweet, with Geological Maps. 1 vol. 8vo. cloth, $3.

MODERN STREET LIGHTING.—By William Sugg. 8vo. paper. 75 cents.

WILKINS—How to Manage Gas; 24mo., paper. Price, 25c

SCHILLING—Traite d'Eclairage par le Gaz. Price, $22.

For sale by

D. VAN NOSTRAND, Publisher,

23 Murray Street and 27 Warren Street (Upstairs).

☞ Our new and revised Catalogue of American and Foreign Scientific Books, 80 p. 8vo., sent to any address, on receipt of ten cents in postage stamps. 282

SCHOOL OF MINES,

COLUMBIA COLLEGE,

EAST 49th STREET, NEW YORK.

FACULTY:

F. A. P. BARNARD, S.T.D., LL.D., President.
T. EGLESTON, Jr., E.M., Mineralogy and Metallurgy.
FRANCIS L. VINTON, E.M., Mining Engineer.
C. F. CHANDLER, Ph. D., Analytical and Applied Chemistry.
JOHN TORREY, M.D., LL.D., Botany.
CHARLES A. JOY, Ph.D., General Chemistry.
WILLIAM G. PECK, LL.D., Mechanics.
JOHN H. VAN AMRINGE, A.M., Mathematics.
OGDEN N. ROOD, A.M., Physics.
JOHN S. NEWBERRY, M.D., Geology and Palaeontology.

The plan of this School embraces a three years' course for the degree of Engineer of Mines, or Bachelor of Philosophy.

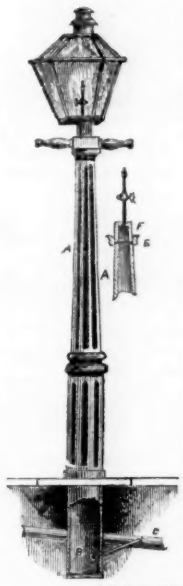
For admission, candidates for a degree must pass an examination in arithmetic, algebra, geometry and plain trigonometry. Persons not candidates for degrees are admitted without examination, and may pursue any or all of the subjects taught. For further information and for catalogue, apply to

DR. C. F. CHANDLER,
Dean of Faculty.

252-1y

GRAHAM'S

Patent Anti-Freezing LAMP POST.



THE BEST, CHEAPEST AND MOST DURABLE POST EVER OFFERED TO THE PUBLIC.

WOOSTER, OHIO
Jan. 24, 1871.

J. W. GRAHAM,

Dear Sir: Yours of the 14th inst at hand. In reply I would say that we have tested the six anti-freezing Lamp Posts purchased from you, and find them to be all as you represented. Whilst nearly a dozen of our sixty-five Posts were frozen down last month and first of this not one of yours was affected by the heavy frost. What can you sell them at?

Yours truly,
LUCAS FLATTERY
Sec'y Wooster Gas-Light Co.

Address the Patentee,

J. W. GRAHAM,
Chillicothe, Ohio.

250-9t

C. GEFRORER,

Manufacturer of

GAS BURNERS,

GAS HEATING AND COOKING APPARATUS,

FITTERS' PROVING APPARATUS. ETC.,

No. 248 North Eighth Street, Philadelphia.

1849. HARRIS, GRIFFIN & CO., 1873.

12th and Brown Streets, Philadelphia, Penna.

and 49 DEY STREET, NEW YORK CITY.

Manufacturers of WET AND DRY GAS METERS, STATION METERS, SHOW AND TEST METERS, METER PROVERS, PRESSURE REGISTERS AND INDICATORS, BAR AND JET PHOTOMETERS, WET AND DRY CENTER VALVES, and all Apparatus pertaining to Gas Works in their line.

Patentee and Sole Manufacturer of the ORIGINAL and ONLY CORRECT GAS EXHAUST GOVERNOR.

We hereby caution all parties against making, vending, or using any GAS EXHAUST GOVERNOR that will be an encroachment of our patent.

The support and confidence of Gas Companies, so long enjoyed by us, encourage us to pursue the same undeviating course that has contributed to establish the character of our house, and with our extended experience and increased facilities, develop the latest improvement that Science can apply, in the construction of Gas Meters, etc., and thereby merit a continuance of the favors hitherto so liberally extended to us, always guaranteeing satisfaction.

ANDREW HARRIS. JOHN J. GRIFFIN.

NOW READY AND FOR SALE,

FODELL'S

System of Bookkeeping

FOR GAS COMPANIES.

Price $5, which should be sent either in Check, P. O. Order, or Registered Letter.

Blank Books, with printed headings and forms on this system, will be supplied to Gas Companies, by applying to W. P. FODELL, Philadelphia, or

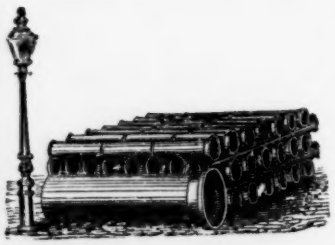
A. M. CALLENDER & CO.,
Office GAS-LIGHT JOURNAL, 42 Pine St., N.Y.

R. D. WOOD & CO.,

PHILADELPHIA.

MANUFACTURERS OF

CAST IRON GAS & WATER PIPES,
Matthews Patent Hydrants,
Lamp Posts, Etc.



For the accommodation of parties who may want small lots Pipe for *immediate* delivery, we have established a yard in New York City.

We have on hand here several thousand feet of small Pipe from which we can ship orders readily to any part of the country.

R. PAINE, Selling Agent,
No. 173 Broadway, New York,
SECOND FLOOR.

AGENCY FOR

GIBSON'S IMPROVEMENT

IN THE

Manufacture of Coal Gas,

42 PINE STREET, ROOM 18.

The undersigned having been appointed Special Agent for the introduction of GIBSON'S Substitute for Dip-Pipes in the Manufacture of Coal Gas, respectfully presents for the consideration of Gas-Light Companies the Circulars and Pamphlet issued by the American Coal Gas-Light Imp. Co., descriptive of the value of GIBSON'S Improvement, and the mode by which Gas-Light Companies can satisfy themselves of its usefulness, without trouble or expense, at their own works.

Orders for fitting up Valves of any desired form or patent, *subject to the generality of the Gibson claim*, and also for SUPPLIES and MATERIALS of every description required for the use of Gas Light Companies promptly attended to by

W. H. GRENELLE, Special Agent.

REFERENCE.—RICHARD MERRIFIELD, Esq., late Vice-President MANHATTAN GAS-LIGHT COMPANY.

NORTHWESTERN

GAS AND WATER PIPE COMPANY.

WORKS, AT BAY CITY, MICHIGAN.

CHICAGO OFFICE, 646 WABASH AVENUE

SECTION OF GAS PIPE

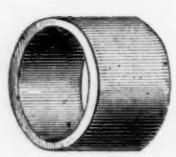


FIG. 2.

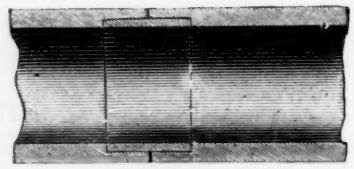


FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3.—Horizontal Section and Connection.

Above is a cut of the

"WYCKOFF PATENT IMPERISHABLE GAS PIPE,"

manufactured by the NORTHWESTERN GAS AND WATER PIPE COMPANY.

This Pipe is made of White Pine, one inch to sixteen inches bore, in sections eight feet long rounded in a lathe, coated inside and out with Asphaltum, connected with a tenon, or socket, and a thimble joint, perfectly air and water tight, being driven together with cement furnished by the Company. When laid its cost is about one half that of Iron Pipe, and is UNQUESTIONABLY the best Gas conducting Main in use.

☞ Send for Descriptive Pamphlet and Price List. 242–1y

S. FULTON & CO.,

PLYMOUTH IRON WORKS,

CONSHOCKEN, PA.,

Manufacturers of

PIG IRON & CAST IRON GAS & WATER PIPES, AND PUDDLED BARS.

Also, Heavy and Light Castings of every description.
242 South Third Street Philadelphia, Pa.

SAMUEL FULTON, THEO. TREWENDT

RILEY A. BRICK & CO.,

MANUFACTURERS OF

CAST IRON PIPES,

FOR WATER AND GAS,

ALSO,

GAS WORKS AND MACHINERY CASTINGS

OF EVERY DESCRIPTION,

No. 112 Leonard Street, New York.

RILEY A. BRICK. JAS L. ROBERTSON

SAMUEL DOWN, President.
H. CARTWRIGHT, Vice-President.

THOMAS J. EARLE, Secretary.
T. C. HOPPER, General Superintendent.

AMERICAN METER COMPANY,

MANUFACTURERS OF

Wet and Dry Gas Meters (with Slide or Rotary Valves), Station Meters, Dry Centre Valves, Pressure Registers, Pressure and Vacuum Registers, Meter Provers, King's Pressure and Vacuum Gauges, Exhauster Governors, Experimental Meters, Watchman's Clocks, Etc., Etc.

☞ Sole Agents for W. Sugg's **PHOTOMETRICAL** and **ANALYTICAL GAS APPARATUS.**

A full assortment of the above kept at the Manufactories and Agencies, where orders may be addressed,

Agencies.

S. E. Corner Fourth Street and Central Avenue, Cincinnati.
32 West Washington Street Chicago.
511 Olive Street, St. Louis.

American Meter Compauy,

512 West Twenty-sceond Street, New York.
Arch and Twenty-second Street, Philadelphia.
324 Washington Street, Boston.

HARRIS & BROTHER,

ESTABLISHED 1848.

PRACTICAL GAS METER MANUFACTURERS,

Continue as heretofore at the OLD ESTABLISHMENT, Nos. 1115 and 1117 Cherry Street, Philadelphia, Pa.,

To manufacture Wet and Dry Gas Meters, Station Meters, Experimental Meters, Meter Provers, Centre Seals, Governors, Pressure Registers, Indicators, Photometers, and all kinds of Gas Apparatus; Also furnish all other Articles appertaining to the use of Gas Works.

From our long Practical Experience of the Business (covering a period of 20 years) and from our personal supervision of all Work, we can guarantee all orders to be executed promptly, and in every respect satisfactorily.

J. Wesley Harris, Washington Harris, William Helme.

WILLIAM W. GOODWIN & CO.

No. 1012, 1014 and 1016 Filbert Street,

Philadelphia, Penn'a.

MANUFACTURERS OF

Dry and Wet GAS METERS, Station Meters (Square, Cylindrical or in Staves), Glazed Meters, King's and Sugg's Experimental Meters, Lamp Post Meters, Etc., Etc., Meter Provers (sizes 2, 5 and 10 feet), Pressure Guages of all kinds, Pressure Registers, Pressure and Vacuum Registers, Pressure Indicators (sizes 4 inch, 6 inch and 9 inch), King's Pressure and Vacuum Gauges, Dry and Wet Centre Seals, Dry and Wet Governors, Exhauster Governors, Photometers of all descriptions. Letheby's Sulphur and Ammonia Test Apparatus complete—also Testing and Chemical Apparatus of all kinds, and of the most perfect description, for all purposes relating to Gas.

Goodwin's Improved Lowe's Jet Photometer.

W. W. Goodwin is the author of the History and Principles involved in the use of Lowe's Jet Photometer. Also Patentee and we are the SOLE MANUFACTURERS of the ORIGINAL and ONLY DIAL whereby the CANDLE POWER and PRESSURE can be instantly read, and all others are infringements.

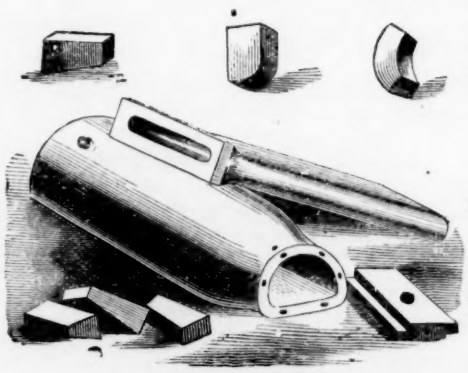
Special attention to repairs of Meters, and all apparatus connected with the business.

All work guaranteed first class in every particular, and orders filled promptly.

WILLIAM WALLACE GOODWIN. [335 1y] HOWARD KIRK, Special Partner.

BALTIMORE RETORT AND FIRE BRICK WORKS.

GEO. C. HICKS & CO.



CLAY RETORTS FOR GAS WORKS AND SUGAR REFINERIES.

TILES AND BLOCKS OF ALL KINDS.

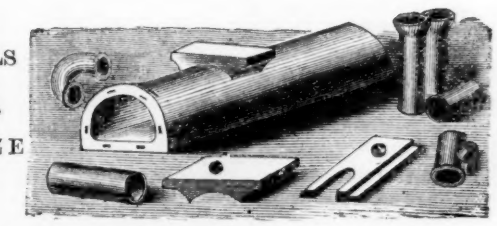
FIRE BRICK.

FIRE MORTAR, CLAY AND SAND.

ALL KINDS OF FIRE CLAY MATERIALS

The Only XX Fire Brick.

☞ RETORTS OF THE VARIOUS SIZE KEPT ON HAND.



Vitrified Steam Pressed Drain and Sewer Pipe.

THOMAS T. TASKER JR. STEPHEN P. M. TASKER.

MORRIS, TASKER & CO.,

PASCAL IRON WORKS, PHILADELPHIA.

TASKER IRON WORKS, NEWCASTLE, DEL.

Office, Fifth and Tasker Streets, Philadelphia.

Office and Warehouse, 15 Gold Street, New York.

Office and Warehouse 36 Oliver Street, Boston, Mass.

Established 1821.

FOR GAS WORKS MACHINERY, ADDRESS OFFICE, FIFTH AND TASKER STREETS, PHILADELPHIA.

Manufacturers and Builders of Gas Works, &c., of all Descriptions, of the Most Approved Plans.

WROUGHT IRON ROOF FRAMES.—For Slate, or Corrugated Iron Coverings, with Cast Iron Cornice Gutter. Iron Doors and Frames, Wrought Iron Pivot Blinds, Windows and all kinds of Castings and Smith Work for Buildings.

BENCH CASTINGS.—Retorts, and all Castings and Wrought Iron Work required for Setting them on the Latest Plan. Tar Gates, Wrought Iron Stand Pipes, Retort Lids, Cotter Bars, Coal and Coke Wagons, and Stokers' Tools.

EXHAUSTERS.—Exhausters and Compensators, By-Passes to pass from 4,000 to 150,000 Cubic feet of Gas per hour, with Engines, Governors, Pressure and Vacuum Guages.

SCRUBBERS.—Single or Multitubular Scrubbers, with Self-Acting Pumps for Ammonia Water.

WASHERS.—Cataract and Single and Multitubular Spray Washers

CONDENSERS.—Single and Multitubular Air and Water Condensers.

PURIFIERS.—For Purifying from 1,000 to 2,000,000 cubic feet capacity daily, with either wet or dry Lime, or Oxide of Iron, and with either Ash Rivetted or Wrought or Cast Iron Lime Sieves.

CARRIAGES.—Movable Lifting Carriages for Purifiers, arranged either for Floor or Overhead use.

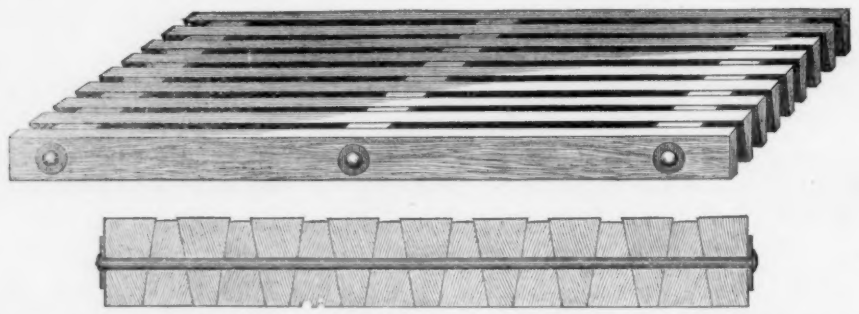
METERS.—Square and Round Meters of any capacity.

GAS HOLDERS.—Single Lift and Telescopic Gasholders, with Cast or Wrought Iron Suspension Frames.

GAS GOVERNORS.—Station Governors, with Regulating and Indicating Columns for Inlet and Outlet Pipes, also Dry Governors with Flexible Diaphragms for Underground Pipes.

STOP VALVES.—Double Faced Stop Valves for Gas or Water, from three inches to forty-eight inches diameter. These Valves are proved on both sides, with a heavy Water Pressure, Flange and Bell Pipes, Fittings and Drips of all descriptions. Steam Boilers and Hot Water Apparatus for Heating Building, and Gas Holder Tanks. Lamp Posts and Lanterns.

P. Munzinger's Patent Ash Lime Trays.



In use at the following Gas-Light Companies:

Pittsburg Gas Company, Pa.
Peoples Gas Company, Baltimore.
Lowell Gas-Light Company, Mass.
Lynn Gas-Light Company, Mass.
Albany Gas-Light Company, N. Y.
Schenectady Gas Light Company, N. Y.
Utica Gas-Light Comwany, N. Y.
Jersey City Gas Company, N. J.
St. Paul Gas-Light Company, Minn.
Cumberland Gas-Light Company, Md.
Hartford City Gas-Light Company, Conn.
Richmond Gas Company, Va.
McKeesport Gas Company, Pa.
Middletown Gas Company, Pa.
East Newark Gas-Light Company, N. J.
Binghampton Gas Company, N. J.
Zanesville Gas Company, Ohio.

New Orleans Gas Company, La.
Salem Gas-Light Company, Mass.
New Britain Gas-Light Company, Conn.
Rahway Gas-Light Company, N. J.
Trenton Gas-Light Company, N. J.
Elmira Gas Company, New York.
Erie Gas Company, Pa.
Columbus Gas-Light Company, Ohio,
Westchester Gas-Light Company, N. Y.
Santa Cruz Gas Company, Cal.
Lawrence Gas-Light Company, Kansas.
Salem Gas Company, N. J.
Indiana Gas-Light Company, Pa.
Peoria Gas Company, Ill.
Montclair Gas Company, N. J.
Williamsport Gas Company, Pa.
Wooster Gas-Light Company, Ohio.

Augusta Gas-Light Company, Ga.
Huntsville Gas Company, Ga.
Chattanooga Gas Company Tenn.
Murfreesboro Gas Company, Tenn.
Hagerstown Gas-Light Company, Md.
Hanover Gas Company, Pa.
Easton Gas Company, Pa.
Uniontown Gas-Light Company, Pa.
Coatesville Gas-Light Company, Pa.
Houston, Gas Company, Texas.
Wilkesbarre Gas Company, La.
Middletown Gas Company, New York.
Washington Gas-Light Company, Pa.
Princeton Gas-Light Company, N. J
Newark Gas Company, Ohio.
Pontiac Gas-Light Company, Mich
And numerous other Companies.